

Allan R. Keiler

A Phonological Study
of the Indo-European
Laryngeals

Mouton

In the present study, Mr. Keiler has chosen as his task the establishment of the contrasting sound properties of the Indo-European laryngeals. Previous attempts at describing the contrastive properties of the laryngeals have involved unwarranted and unproved phonetic speculation and unjustified proliferation of the laryngeal phonemes. In addition, it has been a general methodological practice in IE studies to emphasize the importance of the structural, functional, or purely algebraic nature of the laryngeals.

Mr. Keiler contends that the phonological description of the IE laryngeals is necessary for three reasons. First: The laryngeal theory that has as one of its central merits its insight into the quantitative alternation of long vowels with shwa primum within the root patterning of IE, contains a gross inconsistency: the fact that the allophones of otherwise stable laryngeal *consonants* in IE nevertheless function as *syllabics* in certain stated environments. An inquiry into the phonological nature of the laryngeals may show that this dual syllabic role is as inherent to the laryngeals as it is to the other IE sonants.

Second: Recent attempts to extend the explanatory basis of the laryngeal theory, based on one or another proposed phonological definition of the laryngeals, are often contradictory as a result of *ad hoc* formulation for the specific purpose of explaining certain manifestations of sound change. Within the framework of the algebraic approach, it is impossible to state that any such proposed set of sound changes is or is not possible in view of the phonological nature of the laryngeals.

Third: The phonemic system of IE as a whole remains unintegrated as long as the laryngeals are merely symbols added to the phonemic inventory of IE; the establishing of the phonological nature of one of its subsets of phonemes, the laryngeals, may have far-reaching consequences for the entire system itself.

A PHONOLOGICAL STUDY
OF THE INDO-EUROPEAN LARYNGEALS

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SERIES PRACTICA
76



1970
MOUTON
THE HAGUE • PARIS

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by

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Printed in The Netherlands by Mouton & Co., Printers, The Hague.

PREFACE

The question of the phonological or distinctive feature nature of the Indo-European laryngeal phonemes has never been given a dominant role in IE laryngeal studies, nor, more important, even a sufficient study. Indeed the two leading IE scholars now writing have voiced nearly identical sentiments concerning attempts to determine the phonological nature of the IE laryngeals. Kuryłowicz has thus stated that “Ces spéculations PHONÉTIQUES ont certainement vicié une théorie qui s’en tenait par ailleurs aux traits fonctionnels des ÉLÉMENTS ə .” (*L’apophonie en indo-européen*, Wrocław, 1956, p. 169.) Most recently Benveniste has reasserted that “On a trop cherché à convertir les laryngales en réalités phonétiques. Nous avons toujours pensé que le statut qui leur convenait présentement était celui d’êtres algébriques.” (*Hittite et indo-européen*, Paris, 1962, p. 10.) One can hardly find fault with methodologically emphasizing the importance of the structural, functional, or purely algebraic nature of the IE laryngeals. The entire *Mémoire* of de Saussure is brilliant testimony to the value of the algebraic position in laryngealist studies. In fact, most of the insight into IE root structure, ablaut, and the development of vocalic morphophonemics in general in IE that has been achieved with the aid of the laryngeals has come from uniting more or less phonologically disembodied laryngeals with the contrastive phonemic and morphophonemic relations in IE. One must admit in addition that many attempts at describing allophones of the laryngeals, or merely their principal contrastive properties, have contained more unwarranted and unproven phonetic speculation than really successful results, as well as a totally unjustified proliferation of laryngeal phonemes. Such attempts can hardly add to the purely algebraic insight into the laryngeals.

There are, nonetheless, reasons for undertaking to establish the contrasting sound properties of the laryngeals, apart from merely the interest which would be attached to new information about the IE laryngeals and the IE phonemic pattern in general. One of the central merits of the laryngeal theory is the insight it gives into the quantitative alternation of long vowels with shwa primum within the root patterning of IE, yet this very insight involves a serious inconsistency, and one which is inevitably phonological in nature — the fact that the allophones of otherwise stable laryngeal

consonants in IE nevertheless function similarly to the other *coefficients sonantiques* of IE, i.e., as syllabics in certain stated environments. The inconsistency can be simply avoided (which is what the algebraic position allows), or the question can be begged by unjustifiable reduced grade vowels of one kind or another. If not, then the question has to be asked, and has been through the entire span of laryngealist writings from the time of de Saussure, as most recently by Wyatt: "How can [h] develop into a vocalic element?", since "... it is difficult to see how an essentially consonantal element can be vocalized." ("Structural linguistics and the laryngeal theory", *Language* 40.138-152, 1964, 148.) How much easier the whole matter would be if the phonological nature of the laryngeals turns out to be such that this dual syllabic role is as inherent to the laryngeals as it is to the other IE sonants. A second reason for such a study as presented here is that attempts to apply the laryngeal theory to difficult phonological and morphological problems of the IE languages many times necessarily involve sound changes, i.e., postulated reflexes of the laryngeals. In other words, many recent attempts to extend the explanatory basis of the laryngeal theory are based on one proposed phonological definition of the laryngeals, whether stated or implicit, and many of them are obviously contradictory, since such definitions are set up in many cases *ad hoc* to agree with the proposed sound changes in the first place. The purely disembodied algebraic approach does not of course permit the possibility of stating, if only typologically, that any such proposed set of sound changes could not be feasible in view of the phonological nature of the laryngeals. It is precisely this algebraic approach that has surely led to so many unacceptable corollaries to the laryngeal theory. If the laryngeal theory is going to be increasingly more useful phonologically as a tool in IE research, then I think that one must attempt to arrive at their contrastive phonological properties, so as to be able to delimit the kinds of sound changes attributed to them. The particular theory of such contrastive phonological properties may change (i.e., for the better) but it cannot be merely set up *ad hoc*, whatever the consequences to other parts of the theory, to correspond to whatever new set of reflexes is associated with them. Finally the phonemic system of IE as a whole remains unintegrated as long as the laryngeals are merely symbols added to the phonemic inventory of IE, and since the entire system may be affected by whatever the phonological nature of particular subsets of phonemes are, such admittedly secondary questions as the prehistory of IE itself, and possible genetic relationship to other linguistic families are impeded. The following chapters are an attempt to provide such a phonological description of the IE laryngeals.

I wish to thank Professor Roman Jakobson for many discussions concerning the phonological arguments presented here, and Professor Calvert Watkins for his suggestions and valuable criticism of the whole manuscript.

Ann Arbor, June, 1970

A. R. KEILER

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THE INDO-EUROPEAN LARYNGEAL THEORY

1.0. Streitberg, in 1914, said of de Saussure: "Seine unvergleichliche Stärke ist die Synthese; alle Einzelbeobachtungen sind ihm nur Bausteine zu dem planvoll gefügten Gebäude des Systems; er ruht und rastet nicht, bis sich alle Tatsachen, aus ihrer Vereinzelung erlöst, zu einem harmonischen Ganzen zusammenschliessen".¹ These qualities were as much in evidence in the author's *Mémoire*² as they were, albeit indirectly, in the later *Cours*.³ De Saussure was particularly fond of strict dichotomous definitional and classificatory rigour, and it is enlightening to view his *Mémoire* and its contributions to Indo-European vocalism and ablaut theory from the point of view of the methodological dichotomies which he employs, although it is much easier now, after some eighty years since the publication of this "*geniale*" monograph, to appreciate the kind of methodological rigour that was certainly second nature to de Saussure. The *Mémoire* introduces, on the one hand, a strict separation between the question of establishing the repertory of IE vocalic units and of the particular morphophonemic alternations in which they play a part. It introduces, on the other, a strict separation between the problem of establishing synchronic stages of Proto-Indo-European in purely descriptive terms, and assumptions about the historical processes which might have been operative in bringing about such stages. In an all-inclusive historical sense, de Saussure's attention to the latter dichotomy allows one to see clearly how much of the laryngeal hypothesis contained in the *Mémoire* is based on what we would at least now identify as the techniques of internal reconstruction, and which are based more or less on comparative methodology. Thus de Saussure's *Mémoire* is both an attempt to bring increasing order into the PIE vowel and ablaut systems, which were still clouded over by a vast assortment of original *a* vowels and unconditioned phonemic splits, and to propose a set of hypothetical earlier stages of IE vocalism in order to account for later structurally anomalous, (synchronic, although reconstructed) facts.

¹ "Persönliche und wissenschaftliche Nachrichten: Ferdinand de Saussure", *Indogermanisches Jahrbuch* 2.203-213 (1914), 203.

² *Mémoire sur le système primitif des voyelles dans les langues indo-européennes* (Leipzig, 1879); also *Recueil des publications scientifiques* (Heidelberg, Carl Winter, 1922).

³ *Cours de linguistique générale*, second edition (Paris, 1922).

1.1. De Saussure established in the *Mémoire* that repertory of IE vowels which has become more or less the basis of IE vocalism and ablaut theory. He begins his work with a firm criticism of much of the controversy which he inherited concerning pre-dialectal IE vocalism: "Le dispute entre les partisans du scindement (*a* primitif affaibli partiellement en *e*) et ceux du double *a* originaire (*a*₁, *a*₂ devenus *e* et *a*), cette dispute, il faut le dire, porte dans le vide, parce qu'on comprend sous le nom d'*a* des langues d'Europe un agrégat qui n'a point d'unité organique".⁴ By putting aside the vowel correspondences in the various IE languages in the environments of the syllabic sonants, or better the reflexes of the syllabic sonants (where S = any sonant, V = any vowel, reflexes of the type VSV, i.e., Gk. *αα*, etc., SV, VS, or V), and by considering Greek and Latin as those IE languages which have preserved most faithfully the original IE vocalism (and thereby substituting unconditioned merger, especially in Indo-Iranian, but partially in the Northern IE languages as well, for spontaneous split), de Saussure sorted out the original IE short vowels in terms of correspondence sets based upon the relative archaism of vowel color in Greek and Latin. These significant PIE vowel contrasts, including Brugmann's *a*₁ and *a*₂, really *e* and *o* (but ablaut *o*, i.e. *o* alternating with *e* in different paradigmatic forms of the same IE root) are based on the following correspondence sets: (1) "Lorsqu'une racine contient l'*a* en grec ou en latin, et que cette racine se retrouve dans les langues du nord, on observe en premier lieu qu'elle y montre la voyelle *a*, mais de plus, et voilà le fait important, QUE CET *a* N'ALTERNE POINT AVEC L'*e* ..." ⁵ and (2) "Il y a des *o* auxquels le sanskrit répond par un *a* bref dans la syllabe ouverte: ainsi l'*o* de *πόσις* *potis* = skr. *pāti* doit être différent de l'*o* de *δόρυ* = skr. *dāru*".⁶ The same, of course, is to be said for the SAME chronological stage of IE, about the long vowels *ē*, *ō* (i.e. ablaut *ō*), *ā* and *ō̄* (in roots which do not show alternating *ē* in other paradigmatic forms). For the latest stage of pre-dialectal IE which de Saussure deals with, then, he establishes the following sub-set of IE vowels:⁷

e (= *a*₁) : *o* (= *a*₂), *Q* (i.e. non-ablaut *o*), *A* (i.e. *a*)
ē : *ō*, *Q̄* (i.e. non-ablaut *ō*), *Ā* (i.e. *ā*)

1.2. The assumptions which de Saussure was able to make, and which were based on his proposed IE vowel schema indicated in §1.1 concerning the hypothetical character of an earlier stage of IE, can best be outlined by dividing the discussion into problems of qualitative and quantitative ablaut. Brugmann had already demonstrated

⁴ *Op. cit.*, p. 7.

⁵ *Op. cit.*, p. 49. Not all examples of the correspondence set Gk. *ā* = Lat. *ā* can be now attributed to de Saussure's *A* (in many cases really *Ae-*, for which see later), although de Saussure himself was careful to set aside correspondence sets which formed part of the reflexes of the IE sonants. Only the existence of comparative evidence for IE *ā* in crucial morphological environments is important here.

⁶ *Op. cit.*, p. 90.

⁷ We include here *Q* (i.e. non-ablaut *o*) and *Q̄* (i.e. non-ablaut *ō*) although de Saussure says that "... de là vient qu'au commencement de ce mémoire (p. 6) *Q* n'est pas compté au nombre des *a* primitifs" (p. 107). But he abandons this separation (for which see § 1.4).

that the contrast $a_1 : a_2$ (i.e. $e : \text{ablaut } o$) dated from the common IE period, and that the qualitative ablaut distinctions underlying such pairs of forms as Gk. δέγκομαι/δέδορκ α were not in fact due to a secondary split of some original IE a vowel in Greek (and Latin). But within the descriptive framework of that period of IE in which the basic features of quantitative and qualitative ablaut had already arisen, Brugmann's further claim that a_2 had arisen as a result of accentual factors was as out of place as Messing's statement that "The usual assumption is that qualitative variation is dependent on the presence or absence of a musical accent in the phrase".⁸ In other words, original accentual conditions are not a substitute for the synchronically operative conditioning factors for the distinction $e : \text{ablaut } o$ at that time when such qualitative distinctions were an integral part of the IE ablaut system. De Saussure has not a word on the origin of the qualitative distinction, but establishes rather two fundamental principles of IE ablaut — the tripartite short vowel ablaut series $e a o$, and the morphological conditioning factors of the fundamental $e : \text{ablaut } o$ distinction. Thus the possible qualitative distinctions within the three short vowel series are, according to de Saussure:

	<i>e-grade</i>	<i>o-grade</i>
(1)	e	o
(2)	a	a ⁹
(3)	o ₂	o

Series (1) is the fundamental qualitative ablaut distinction, series (2) and (3) are numerically rare and relatively isolated. The form of the root which contains the *o-grade* of series (1), however, is not predictable by prosodic or other phonological features, but by the particular morphological category suffixed to the root. De Saussure thus gives at least the clear-cut morphological categories in which the *o-grade* of the root occurs.¹⁰ In terms of the typological role of vowel alternations and vowel distribution de Saussure provides the basis for characterizing IE vocalism as somewhere between a system whose vowel alternations are purely lexical (such as English — *bad, bed, bid* ...) and the Semitic languages (in which different discontinuous vowel patterns signal different grammatical categories). That is, although vowel

⁸ Messing, "Selected studies in Indo-European phonology", *Harvard studies in classical philology* 56-57.161-232 (Cambridge, Mass., 1947), 169.

⁹ De Saussure does not assume the existence of an original $a : o$ ablaut. Cf. his "Pour a_2A et a_2Q après les contractions: A_2 et Q_2 " (p. 128; also pp. 97-100); and principally because "La plupart des étymologues en question sont sujettes à caution" (p. 98). Messing is to be corrected when he states that "According to de Saussure, $e + A = \bar{a}$, but o (ablaut) + $A = \bar{o}$. That is to say, although o is only a substitute for e (e/o ablaut), still the phoneme A has the power to change the color of e but not that of o " (*Op. cit.*, p. 172). The question of whether the *o-grade* vowel of the \bar{a} series is in fact \bar{o} or \bar{a} is still an unsettled problem, but Kuryłowicz (*L'apophonie en indo-européen* [Wrocław, 1956], pp. 167-168) argues convincingly for a neutralization of e/o adjacent to the a -colored laryngeal(s) in those languages which maintained the distinction of IE $*a$ vs. $*o$, and therefore that the *o-grade* of the \bar{a} series is always \bar{a} .

¹⁰ *Op. cit.* See pp. 66-90.

distinctions in IE play no lexically contrastive role, they are only secondarily important in grammatical or inflexional distinctions, since the relation between grammatical suffix and the choice of the fundamental vowel *e*: ablaut *o* of the root is unidirectional — given the grammatical category in IE the particular allomorph of the root is predictable, but not vice versa.¹¹ Within this descriptive framework made possible by de Saussure, series (2) and (3) become largely anomalous for him.¹² If, say, the present indicative active or verb simplex is the morphological condition for the *e* grade of the root except for a small number of lexically isolated cases [those underlying series (2) and (3)] it is reasonable to assume, as de Saussure did, that the *a* and *o*₂ vowels in those particular morphological environments where *e* is expected arose secondarily by some conditioned phonological effect, especially since there is not a trace of any original lexical contrastive function between *e*, *a* and *o*₂.¹³ Thus de Saussure can claim, e.g., that “Il est donc invraisemblable que l’*o* d’un présent comme ὄζω, en d’autres termes l’*o* qui se maintient dans toutes les formes d’une racine, puisse représenter *a*₂”.¹⁴ The same statement, of course, is equally valid for present formations of the type Gk. ἄγω, Lat. *agō*, i.e., those examples which belong to series (2).

If we now include the quantitative ablaut distinctions (but not including lengthened grade) together with the IE long vowels into the short vowel schema already presented, the number of ablaut series increases to six, thus:

	<i>e-grade</i>	<i>o-grade</i>	<i>zero grade</i>
(1)	e	o	Ø
(2)	a	a	Ø
(3)	o ₂	o	Ø
(4)	ē	ō	ə ₁
(5)	ā	ā	ə ₁
(6)	ō ₂	ō	ə ₁

IE *a* and *o*₂, apart from the feature of length, are as anomalous in those particular morphological categories restricted to *ē*, as the same short vowels of series (2) and

¹¹ In a strict taxonomic framework the allophonic variation of IE roots resulting from qualitative ablaut can be handled in several ways. The allomorphs of the root — say *bher/bhor* — can be rewritten morphophonemically as, say, *bhe/or-*, where the morphophoneme *e/o* is morphologically conditioned. Nida’s concept of the supplementary morpheme (see his *Morphology*, second edition [Ann Arbor, 1949], pp. 54, 110) which also underlies Kurylowicz’s distinctions of morphological polarity (see his *L’apophonie en indo-européen* [Wrocław, 1956], pp. 5-23) would assign the ... *o* ... as the supplementary morpheme to the perfect sg., etc. This leads to rather unnecessary redundancy, as well as a kind of morphological discontinuity which would be more imposed than adequate. It is much simpler to accept the first, and traditional analysis, and to speak of any root in the form *bhe/or-*.

¹² Cf. §1.3.

¹³ Cf. in this connection Watkins’ review of Kurylowicz’s *L’apophonie en indo-européen*, *Language* 34.381-398 (1958), 383, concerning the latter’s assumption of an original IE *o* vowel, apart from ablaut *o*, and full-grade *o* arising from a neighboring laryngeal.

¹⁴ *Op. cit.*, p. 91.

(3). But the quantitative ablaut distinctions in the above schema led de Saussure to additional assumptions concerning the partially anomalous aspect of this schema, namely the long vowel series in relation to the single vocalic element in the zero grade alternating with these long vowels — e.g. Skt. *sthitáh*, *ditáh*, *dhitáh*, from the roots *sthā*, *dā*, *dhā*. In purely descriptive terms, unlike the qualitative ablaut distinctions, the distinction between normal (*e*-) grade and zero grade was, at least partially, prosodically conditioned, such that tonic syllable and full-grade, and non-tonic syllable and zero grade coincided. Apart from the question of whether the place of the IE accent at that period of IE in which the quantitative ablaut distinctions were a fixed part of the morphophonemic pattern of IE was itself predictable, the non-accented syllable was the conditioning factor for the deletion of the vowel of that syllable. Now while there is necessarily nothing anomalously striking about the presence of long full-grade vowels (not lengthened grade vowels) alternating with a single vocalic element in the zero grade, the very distribution of LONG VOWELS in the same series as short vowels in full-grade syllables would require an additional set of isolated LEXICAL categories for those IE roots which have long vowels in full-grade forms of the root. By comparing, however, IE roots ending in sonants — *Ceu*, *Cer*, etc. — and their zero grade forms *Cu*, *Cr*, etc., in which the sonant becomes the syllable peak with the deletion of the full-grade vowel, with roots containing long vowels, the long vowels of series (4), (5) and (6), as de Saussure showed, are more similar to diphthongs than to simple vowels. In this connection it is significant that there is no form of the root of the shape CONSONANT PLUS SHORT VOWEL for roots with long vowels, and in fact there are no IE roots ending in short vowels at all.

1.2. De Saussure's *Mémoire* can be viewed as a survey of IE vocalism involving three distinct but integrated stages of description: (1) reconstruction of the IE vowel system and ablaut series based on the comparative evidence of the IE languages; (2) a set of assumptions, largely typologically oriented, about certain anomalous features of this system which could not be integrated convincingly with the overall pattern which had thus emerged; and (3) an explanation of these structurally anomalous features in terms of certain conditioned sound changes which had come about during some earlier period of IE as a result of what were later to be called laryngeal phonemes, which de Saussure postulated for that earlier stage of IE. It is this last aspect of de Saussure's *Mémoire* which has come to be known as the laryngeal hypothesis, but in effect was really the last stage of a more inclusive survey of IE vocalism and ablaut. De Saussure's judgement concerning the last aspect is based on the belief that the main features of IE ablaut relations which he established became obscured by previous conditioned phonetic changes brought about by the presence of two *coefficients sonantiques*, transcribed *A* and *Q*, in the PIE phonemic system before the main lines of IE ablaut had become thus obscured. His original hypotheses concern most immediately the problem of quantitative and qualitative ablaut: (1) De Saussure described the normal grade long vowels of series (4), (5) and (6) above as having

developed from sequences of $*eA$, $*eA$ and $*eQ$ respectively, where A and Q are to be considered as IE sonants or *coefficients sonantiques* on a level with $r l m n y w$: “Les phonèmes A et Q sont des coefficients sonantiques. Ils ne pourront apparaître à nu que dans l’état réduit de la racine. A l’état normal de la racine, il faut qu’ils soient précédés de a_1 , et c’est des combinaisons $a_1 A$, $a_1 Q$, que naissent les longues \bar{A} , \bar{Q} . La permutation $a_1 : a_2$ s’effectue devant A et Q comme ailleurs”.¹⁵ He therefore associates a -color and o -color as well as compensatory lengthening of a preceding fundamental vowel with the phonetically conditioned influence of A and Q , which later disappeared, leaving these reflexes behind to obscure the basic ablaut relations. The problem of IE roots ending in long vowels but not short vowels thus disappears at once: “Ce qui parle bien haut pour que A (i.e., a) et Q (i.e., o_2) soient autre chose que des voyelles simples, c’est partout où d’autres racines au degré 1 (i.e., e -grade), les racines en a ONT UNE LONGUE. Pourquoi, du fait qu’il finit la racine, l’ a se serait-il allongé? Si, au contraire, A est assimilable à une diphthongue, $\sigma\tau\acute{\alpha}\mu\omega\nu$ en regard de $\sigma\tau\acute{\alpha}\tau\acute{o}\varsigma$ s’explique exactement de même que l’indien *ġēman* ($e=a_1i$ monophthongué) en regard de *ġitá*. Toute racine en a est identique dans son organisme avec les racines comme *kai*, *nau*, et aussi *tan*, *bhar*”.¹⁶ The ablaut o -grade vowels of series (4), (5) and (6) are described historically thus:

“pour a_1A et a_1Q après la contraction : \bar{A}_1 (i.e., \bar{e} and \bar{a} , for which more below) et Q_1 (i.e., non-ablaut o)
 a_1A et a_2Q après la contraction: \bar{A}_2 (i.e., ablaut \bar{o} of series 5) et \bar{Q}_2 (i.e., ablaut \bar{o} of series 6)”.¹⁷

The correspondence set shwa primum (Indo-Iranian i , but otherwise a) was simply originally the occurrence of A and Q in the zero grade of roots, although Indo-Iranian i , as well as the triple representation ϵ , α , o in Greek, are both secondary developments of a single (neutralized) laryngeal in the zero grade.¹⁸ (2) De Saussure’s treatment of the short full-grade vowels of series (2) and (3) was not as successful, although he was certainly aware of the difficulties with which his treatment was faced. He assumed that the anomalous a and o vowels of such forms as Gk. $\acute{\alpha}\gamma\omega$, $\delta\zeta\omega$ represent the zero grade of syllables ending in A and Q , and therefore instances of shwa primum.

1.22. In spite of these brilliant hypotheses, however, scholars saw the defects, some obvious enough, in many cases more easily than they appreciated their far-reaching advantages. The two most serious defects, although the proper treatment was readily available within the framework de Saussure elaborated, concerned the status of IE \bar{e} alongside \bar{a} , and the supposed occurrence of shwa primum in the forms Gk. $\acute{\alpha}\gamma\omega$,

¹⁵ *Op. cit.*, p. 127.

¹⁶ *Op. cit.*, p. 128. Cf. also pp. 128-129, fn. 3.

¹⁷ *Op. cit.*, p. 128.

¹⁸ For the question of the laryngeals in the zero grade of syllables, and their historical reflexes (i.e. shwa primum), see Chapter 5.

ǝζω, etc. That the same sequence $*a_1A$ (i.e., $*eA$) could hardly give both \bar{e} and \bar{a} was pointed out continually. Thus Hirt: "Die ganze Sache hat aber ein bedenkliches Loch. Denn der Vokal \bar{e} vermag de Saussure eigentlich nicht zu erklären";¹⁹ also Streitberg: "de Saussure fasst die alten idg. Langen als Verbindungen von $e + A$ ($e + Q$). Hiermit gibt aber eine für ihn unlosbare Schwierigkeit: für $e + A$ besteht Doppelvertretung; es erscheint ohne erkennbaren Grund, als \bar{e} und als \bar{a} ".²⁰ De Saussure, nonetheless, was not unaware of the difficulty concerning IE $*\bar{e}$ within his system. His first assumption, influenced by the Gk. η/ϵ , \bar{a}/α , ω/o parallelism, is stated thus: "L' \bar{e} long, dans notre théorie, ne doit pas être un phonème simple. Il faut qu'il se décompose en deux éléments. Lesquels? Le premier ne peut être que a_1 (e). Le second, le coefficient sonantique, doit apparaître à nu dans la forme réduite. La forme réduite de $\theta\eta$ c'est $\theta\epsilon$. En conséquence on dira que \bar{e} est fait de $e + e$ ".²¹ His rejection of this assumption, however — "Une combinaison a_1a_1 parallèle aux combinaisons a_1A , a_1i , a_1n , etc., fait l'effet d'un contre-sens. S'il y a une raison pour que a_1 , avec son substitut a_2 , possède des attributions qu'aucune autre ne possède, pour que toutes n'apparaissent que comme les satellites de ce phonème, comment admettre que ce même a_1 puisse à son tour se transformer en coefficient?"²² — leads him unfortunately to the conclusion that "rien n'indique entre \bar{e} et \bar{a} une différence foncière et primordiale".²³

De Saussure's justification for considering the initial vowels of the correspondence sets Gk. $\check{\alpha}\gamma\omega$, Lat. *agō*, Skt. *ājati*; Gk. $\delta\zeta\omega$, etc., instances of shwa primum led him to a number of inconsistencies concerning the treatment of shwa primum in Sanskrit. De Saussure takes the view, later elaborated by Bechtel,²⁴ that the vocalism of the present formations $\check{\alpha}\gamma\omega$ ($\delta\zeta\omega$), etc., belong to the \bar{a} series, in which zero grade vocalism (shwa primum) and thematic accentuation appeared in the aorist originally, and long vowel vocalism and root accentuation in the present, with a secondary shift of the aorist to the present formation and subsequent root accentuation attested by such examples. De Saussure's critics were quick to point out that if this were the case, the Sanskrit cognate should be $*ijati$, not *ājati*,²⁵ although de Saussure was well aware of this fact, and stated it himself: "... et qu'autrement on aurait *svidāti* (instead of *svādāti*) comme on a *khidāti*, *ciśāt*".²⁶ De Saussure, however, is willing to see both Skt. *a* (*bhājati*, *mādāti*, *ājati*, etc.) as well as *i* (*sthītā*, *pītār*, etc.) as reflexes of shwa primum, or of A and Q in the zero grade, but conditioned thus: "Le phonème destiné à devenir *i*

¹⁹ Hirt, *Indogermanische Grammatik II* (Heidelberg, 1921), p. 23.

²⁰ *Op. cit.*, p. 209. Cf. Messing, *op. cit.*, p. 171.

²¹ *Op. cit.*, p. 133.

²² *Ibid.*

²³ *Op. cit.*, p. 135.

²⁴ See F. Bechtel, *Die Hauptprobleme der indogermanischen Lautlehre* (Göttingen, 1892), pp. 240ff.

²⁵ See C. D. Buck, "Some general problems of ablaut", *American journal of philology* 17.267-289 (1896), 285-286; Hübschmann, review of Hirt, *Der indogermanische Ablaut*, *Indogermanische Forschungen* Anz. 11 (1900), 27-28; Streitberg, *op. cit.*, p. 209; Hirt, *op. cit.*, p. 24; Couvreur, *De hethetische H* (Louvain, 1937), p. 79; Messing, *op. cit.*, p. 171.

²⁶ *Op. cit.*, p. 166.

dans la syllabe non accentuée a donné *a* sous l'accent".²⁷ But this is not sufficient, since it does not cover the proposed shift from aorist to present which de Saussure supposes: "Reprenons le présent *svádāti* cité précédemment. Ce présent est accompagné d'une seconde forme *svádāti*. Si l'on compare le grec ἄδομαι aoriste ε-ῥαδο-ν on conviendra qu'il y a neuf probabilités sur dix pour que *svádāti* représente sinon l'ancien aoriste, du moins un présent originairement oxyton *svadāti*. L'accent, en sanskrit, a été attiré sur la racine par l'*a* qui s'y trouvait, phénomène que nous constaterons encore plus d'une fois. Aucun présent indien en *a* n'a le ton sur le suffixe quand il y a un *a* dans la racine".²⁸ But we are supposed to find **svidāti*, not *svádāti* originally, and de Saussure admits himself that "On ne comprend en effet ce retrait de l'accent qu'en admettant que la racine possédait déjà un *a* bien caractérisé".²⁹ De Saussure's conclusion to this dilemma, that "On est donc amené à conclure à la diversité sinon tout à fait originaire, du moins proethnique du phonème *A* et de la voyelle qui a donné l'*i* indoiranien",³⁰ seems to suggest an original contrast between the vowel of *svádāti* (and *ājati*) and the *i* (certainly shwa primum) of *sthitá*, *pitár*, etc. As Hübschmann perceptively realized, this conclusion was tantamount to reestablishing an original full-grade *a* vowel (and *o* vowel) for series (2) and (3): "Bestand aber ein hochtöniges *á* (= skr. *a*, griech. *α*), das natürlich weder mit dem hochtönigen idg. *ā* = *éa* (skr. *ā*, griech. *ᾱ*) noch mit dem daraus (in unbetonter Silbe!) entstandenem *a* (*ə*) identisch sein könnte, so muss an diesem *a* das ganze System de Saussures scheitern, das allen Ablaut auf dem Wechsel von *o* : *e* : -zurückführen will".³¹

1.23. In two publications which appeared during the year following de Saussure's *Mémoire*, Hermann Möller added to the two *coefficients sonantiques* of de Saussure a third, which he transcribed *E*, and which he assumed accounted for full-grade *ē* of series (4) by compensatorily lengthening the preceding *e* without affecting its vowel color. Thus he suggests that "... und er (i.e., de Saussure) hätte für Wurzeln wie Stufe 10η- germ. *dē*-, 2germ. *dō*-, 0ε- skr. *hi*- lat. *a* in *ratus*, *satus* nach meiner Ansicht noch ein drittes aufstellen sollen".³² Möller also suggested that for such forms as ἄγω and ὄζω the initial vowels do not represent original *A* and *Q* (i.e. the zero grade of *eA*-, *eQ*-sequences), but rather *Ae*-, *Qe*-, in which the *coefficients sonantiques* preceding full-grade vowel *e* changed the color of that vowel without compensatorily lengthening it. But this suggestion appears somewhat later than his original publications concerning the laryngeals (1879-1880), and he was still, in 1880, willing to explain the *o* ablaut of Gk. ὄγμος e.g. (to ἄγω) as "(ursprüngliches) Svaritawort **ōgm-s*, gen.

²⁷ *Ibid.*

²⁸ *Op. cit.*, p. 163.

²⁹ *Op. cit.*, p. 166.

³⁰ *Op. cit.*, p. 167.

³¹ Hübschmann, *op. cit.*, p. 28.

³² H. Möller, review of Kluge, *Beiträge zur Geschichte der indogermanischen Conjugation*, *Englische Studien* 3.148-164 (1879), 151, fn. 1.

**agmōs*: das griech. *o* entstand durch den Übergang des Ablauts *ō : a* in *ō : o*".³³ But the revisions which Möller finally contributed to de Saussure's original hypothesis did not seem to carry much weight in dispelling any of the doubt which surrounded de Saussure's initial effort.³⁴ Hirt's remarks concerning de Saussure's hypothesis, e.g., are tinged with admiration, but also skepticism: "Er gewinnt damit ein ausserordentliches einfaches Ablautssystem Diese ideale Regelmässigkeit nimmt sich auf dem Papier ganz nett aus, sie braucht aber in Wirklichkeit nicht zu bestehen".³⁵ This in spite of the fact that Hirt casts the same doubt on the original *a* and *o* series alongside the fundamental *e : o* ablaut as did de Saussure. Thus he remarks, concerning such forms as *ǣγω*, *ǫζω* that "Bei allen diesen handelt es sich um vereinzelte Fälle. Je länger, je mehr ist alles in der Rahmen der *e*-Verben eingespannt worden".³⁶ In Hirt's final survey of IE vocalism he remarks, concerning *a : o* ablaut, that "Neben *a* findet sich allerdings in einigen Sippen ein *o*; aber wie dessen Verhältnis zu *a* aufzufassen ist, bleibt unklar. Ohne Zweifel erscheint *o* in Wechsel mit *a* nicht in der Kategorien, in den *o* neben *e* auftritt,"³⁷ and concerning an original full-grade *ō* vocalism, that "Nun sind aber auch die Laute ursprünglich *ō*, *o* ziemlich selten und — wie mir scheinen will — sekundär entstanden. So geht *ō* in einer Reihe von Fällen auf *ōu* und dies wider auf *eu* zurück".³⁸

1.24. Two additional corollaries to the laryngeal hypothesis were described by de Saussure in the *Mémoire*, and were in fact the first of a series of phonological and morphological insights which de Saussure's hypothesis was able to bring to IE studies in general. These concern the unification of the nasal athematic classes in terms of their morphological elements, and the origin of Brugmann's long syllabic sonants. (1) De Saussure views the 7th class nasal infix presents — Skt. *pundāti*, *prndāti* etc. — as a special case of the 9th class nasal infix presents, in which the final consonantal

³³ Möller, "Die Entstehung des *o*", *Beiträge zur Geschichte der deutschen Sprache und Literatur* 7.492-534 (1880), 511. Cf. also p. 492, fn. 2. It is clear from this and similar passages in Möller's discussion of the origin of IE ablaut *o*, that he had by no means, at least in print, arrived at the explanation of such forms as *ǣγω*, *ǫζω*, as earlier sequences of *Ae-*, *Qe-* at this time (1879-1880) as is often indicated (cf. e.g. Messing, *op. cit.*, p. 172; Cuny, "Notes de phonétique historique: indo-européen et sémitique", *Revue de phonétique* 12.101-132 (1912), 101). This suggestion appears as an integral part of the author's laryngeal system in his *Semitisch und indogermanisch, Erster Teil, Konsonanten* (Copenhagen, 1906). Its first mention in print by Möller seems to be not earlier than his review of Bechtel, *Hauptprobleme der indogermanischen Lautlehre, Zeitschrift für deutsche Philologie* 35.366-394 (1892) 386, fn. 1, in a passage that is strongly reminiscent of Benveniste's later theory of the root: "Oft erscheint der Vokal an erster Stelle anlautend als *a* anstatt des erwarteten *e*, S. die von Saussure, *Mem.* 275-283 zusammengestellten '*phénomènes spéciaux*': *aus-: ves-, auk-: veks-, (*anbh-) ambh-: nebh-, (*amd-:) andh-: medh-* usw. Ob ein später verlorener urindogermanischer konsonant, den ich hier mit ' bezeichnen will, ein folgendes *é* in *a* gewandelt (oder das ursprüngliche *á* konserviert) hat, '*eus* (> *aus*): '*ves*, aus '*áva* : '*avása*?"

³⁴ Cf. Cuny, *op. cit.*, p. 101.

³⁵ *Op. cit.*, p. 23.

³⁶ *Indogermanische Grammatik IV*, p. 185; cf. Messing, *op. cit.*, p. 169.

³⁷ Hirt, *Die Hauptprobleme der indogermanischen Sprachwissenschaft*, edited by Helmut Arntz (Halle, 1939), p. 141.

³⁸ *Ibid.*

element of the root is a *coefficient sonantique*. Thus his role about nasal infix formation is generally: “L’*a*₁ radical tombe et la syllabe -*na*₁- est insérée entre les deux derniers éléments de la racine réduite”.³⁹ Fifth, seventh and ninth class nasal presents become structurally equivalent, therefore — *bheid* : *bhi-ne-d*, Skt. *bhinátti*; *peu* : *pu-ne-A*, Skt. *pundáti*; *tenu* : *tñ-ne-u*, Skt. *tanóti*. Now it was precisely these 7th class nasal verbs which most generally showed the connecting -*i*- vowel (i.e., of set bases) in Sanskrit before those suffixes which require the full-grade of the root — *pundáti* : *pávitar*; *lunáti* : *lāvitum*, etc. (2) De Saussure could therefore state that “Dès qu’on admet le lien qui unit le présent en *na* avec l’*i* final, on reconnaît que cet *i*, loin d’être une insertion mécanique vide de sens, fait partie intégrante de la racine”.⁴⁰ These same roots, i.e., set bases, before suffixes which require the zero grade of the root, will contain sequences of sonant plus *A/Q* (if the root happens to be of the pattern *CeSA/Q*) — *dhávitum* : *dhūtaḥ* < *dheuA* (*A* = *A* or *Q* here): *dhuA*; *pārītum* : *pūrtva* < *perA* : *prA* — so that Skt. *ir/ūr* (*ir/ur* before a vowel), *ān*, *ā*, etc., which Brugmann reconstructed as reflexes of the long syllabic sonants *ī*, *ñ*, *ṛ*, etc., were originally merely the zero grade of set roots *CeSA* occurring before consonants — i.e., sequences of SONANT + LARYNGEAL.⁴¹

1.3. The discovery of the Hittite documents in 1905 at Boghazköy and their virtual decipherment by Hrozný in 1917 brought forth not only conclusive evidence of the preservation of the laryngeal consonants, and consistently represented by the Hittite orthography in an overwhelmingly certain number of linguistic environments where they had been set up ex hypothesi decades before by de Saussure.⁴² These documents brought forth additionally the traditional comparative data, first discussed significantly in relation to the laryngeal hypothesis in 1927 by Kuryłowicz⁴³ which had until that point been lacking in IE laryngeal studies. A number of revisions and partial reformulations subsequently appeared, either directly or indirectly based on the new evidence which Hittite brought forth. More specifically, the discussion here includes those pro-

³⁹ *Op. cit.*, p. 224.

⁴⁰ *Op. cit.*, p. 225.

⁴¹ Puhvel’s *Laryngeals and the Indo-European verb* (Berkeley, 1960), gives an inclusive bibliography of works dealing with the laryngeals, and Messing, *op. cit.*, presents a fairly exhaustive discussion (until 1947) of the extent to which the laryngeal theory was applied to various questions of IE phonology and morphology.

⁴² This in spite of early erroneous attempts to explain examples of Hittite *h/hh* orthography as the reflexes of various IE velar phonemes (e.g., B. Hrozný, *Die Sprache der Hethiter* [Leipzig, 1917], p. 190; C. Marstrand, *Caractère indo-européen de la langue hittite* [Christiana, 1919], pp. 141-150, 161-162) and later attempts to explain *h/hh* as developments peculiar to Hittite, and usually as a glide sound originally occurring intervocalically to avoid hiatus, or as a graphic indication of the voiceless character of a preceding consonant (e.g., C. Marstrand, Review of Kuryłowicz, “*ə* indoeuropéen et *h* hittite”, *Norsk Tidsskrift for Sprogvidenskap* 3.290-205 (1929); W. Petersen, “The origin of Hittite *h*”, *Language* 10.307-322 (1934). Couvreur presents a detailed history of this scholarship, *op. cit.*, pp. 58-70.

⁴³ Kuryłowicz, “*ə* indoeuropéen et *h* hittite”, *Symbolae grammaticae in honorem Ioannis Rozwadowski* 95-104 (Cracow, 1927).

concerned with diminishing the laryngeal inventory to only two phonemes (i.e., by eliminating the *o*-colored laryngeal — de Saussure's *Q*), and those concerned with augmenting it to four laryngeals (and more), by postulating either a second *a*-colored or a second *e*-colored laryngeal. Such proposals, in a larger sense, are part of the general question of the exact number of laryngeals to be assigned to IE, and the relation and interpretation of the Hittite evidence from the point of view of the laryngeal theory as a whole.

1.4. We now want to discuss those proposals outlined in §1.31 concerned with changing the inventory of IE laryngeals, and which have been based directly or indirectly on the evidence provided by Hittite.⁴⁴ Those arguments for the possible reduction of de Saussure's (and Möller's) original *e*-, *a*-, and *o*-colored laryngeals concern the elimination of the *o*-colored laryngeal (de Saussure's *Q*).⁴⁵ It is not surprising that even many of those Indo-Europeanists who are willing to accept, in the main, the

⁴⁴ We shall not discuss all of the etymological evidence in Hittite relevant to the laryngeals, but only sufficient evidence to make the conclusions evident. The Hittite vocabulary that involves the IE laryngeal phonemes is discussed principally in the following works: Kuryłowicz, *op. cit.*; Couvreur, *op. cit.*; Hendriksen, *Untersuchungen über die Bedeutung des Hethitischen für die Laryngalthorie*, Det Kongelige Danske Videnskabernes Selskab Hist.-fil. Medd. 28 (1941); Pedersen, *Hittitisch und die anderen indoeuropäischen Sprachen* (Copenhagen, 1938); Sturtevant, *op. cit.*, and *A comparative grammar of the Hittite language*, second edition (Philadelphia, 1951); Crossland, "A reconsideration of the Hittite evidence for the existence of 'laryngeals' in Primitive Indo-European", *Transactions of the Philological Society* (1951), 88-130; Messing, *op. cit.*, Lehmann, *Proto-Indo-European phonology* (Austin, 1952), pp. 25-28. Our discussion uses these works, as well as the *Hethitisches Wörterbuch* (Heidelberg, 1952-1957), and *Hethitisches Elementarbuch*, second edition (Heidelberg, 1960), of Johannes Friedrich as the main sources of reference.

⁴⁵ De Saussure was himself somewhat skeptical at times during the course of the *Mémoire* concerning the status of his *Q*: "Mais quelles données avons-nous sur l'histoire du phonème *Q*? On peut dire qu'il n'en existe absolument aucune. Ce qui permet d'affirmer que l'*o*₂ du sud a eu son équivalent dans le nord, c'est que l'*a* qui lui correspond en slavo-germanique a des fonctions spéciales et des rapports réguliers avec *e* qui le séparent nettement de *A*. Au contraire le rôle grammatical de *Q* ne diffère pas essentiellement de celui de *A*, et si, dans de telles conditions, nous trouvons que les langues du nord répondent à *Q* absolument comme elles font à *A*, nous sommes naturellement privés de tout moyen de contrôle relativement de l'ancienneté du phonème en question" (pp. 106-107). Considering the kind of independent evidence (i.e., non-Graeco-Italic) de Saussure requires, he naturally sees the proof for an IE *Q* in Lithuanian *š*. Möller, who was to accept de Saussure's *Q* unqualifiedly, surprisingly enough insists (*op. cit.*, 1880) that "Saussures Element *O* beilegt, sicher nicht bestanden und vielleicht hat das Element *Q* und also eine Ablautreihe *ō:ō:o* überhaupt nicht existiert" (p. 492, fn. 2). Holger Pedersen attempted to provide the necessary proof for the non-existence of an original full-grade *o*. He did show that Lithuanian *š* is not the exclusive source of *Q* nor of *Q* alone. (The evidence is clearer now, and is less important as a source for *Q* than de Saussure considered. See e.g., Watkins, "Evidence for laryngeals in Balto-Slavic", *Evidence for Laryngeals* 42-52, Werner Winter, editor (University of Texas, 1960), 46-53). But his attempt to show that the cases of anomalous *o* must be explained as part of the difficult question of the origin of ablaut *o* confuses the synchronic and diachronic aspects of the question that de Saussure so brilliantly separated: "Nun ist es je längst anerkannt, dass der Ablaut nicht von der morphologischen Kategorien abhängt, sondern durch rein lautlichen Factoren ins Leben getreten ist. Diese lautlichen Factoren sind uns für die *o*-stufe noch gänzlich unbekannt ..." ("Wie viel Laute gab es in Indogermanischen", *Zeitschrift für vergleichende Sprachforschung* 36.73-110 (1900), 95-96). Cf. Martinet, "Non-apophonic *o*-vocalism in Indo-European", *Word* 9.253-267 (1953), for an important statement which separates the synchronic and diachronic points of view more rigorously.

laryngeal theory and de Saussure's original assumptions concerning his *A* and *Q*, are more conservative about postulating with certainty an IE *Q*, since the IE vowel system had at the same time as the other laryngeals at least the ablaut vowel *o*, whose origin and history can still not be elucidated clearly. Thus Hendriksen has stated that "Die Beispiele für den letzteren Fall (i.e. *Q*) sind jedoch weder zahlreich noch unbedingt beweiskräftig, da man nicht wissen kann, ob der Vokal der *o*-Stufe nicht etwa bisweilen in die Formen, die sonst die Grundstufe fordern, eingedrungen ist";⁴⁶ and similarly Crossland: "Neither the length of the -η- in τῖθημι nor the *a*-vocalism in, e.g. ἄγω and στᾶθι, has been satisfactorily explained without assumption of loss of a laryngeal, but in the case of the words thought to require the postulation of a *o*-laryngeal, one cannot feel certain that the *o*-grade of ablaut-vocalism had not been introduced analogically in positions in which it would originally have been abnormal, or that the *o*-vocalism might not in some cases have been caused by a consonant actually preserved in the Greek words, instead of by a lost laryngeal".⁴⁷ But these arguments belong to the last stronghold of resistance, and none has explained convincingly (if at all) how the working of analogy or phonetic influence (other than that of the lost laryngeal) might really account for such forms (δίδωμι, ὄζω, ὀστέον, etc.). Only Sturtevant has attempted any full-scale arguments against the existence of de Saussure's *Q* from the Hittite evidence,⁴⁸ and these arguments show all of the weaknesses of such attempts, and raise in addition as many problems as they are supposed to settle.

There can be little doubt now that two of the forms with supposed full-grade (i.e. non-ablaut) *o* listed by de Saussure⁴⁹ must be removed from that list, since Sturtevant has showed that Lat. *nox* must contain *o*-grade alongside Hitt. *nekuz* 'evening', *nekuzi* 'it is evening',⁵⁰ both with indisputable *e*-grade; and similarly Lat. *fodiō* 'dig', Hitt. *beda-* 'dig', Lith. *bedù* 'dig'.⁵¹ The remaining arguments, however, which Sturtevant proposes against full-grade *o* (not one of which adduces similar incontrovertible evidence against Gk. ὀστέον, OIr. *orgaim*, Gk. ὄρνις, etc.) are based on his assumptions concerning the orthographical representation of the IE laryngeals as Hittite *h/hh*. The important question here is whether the single vs. double writing of laryngeals in Hittite really represents a phonemic contrast. Now the only evidence for this is the orthographic contrast, which is supposed to occur intervocally after Hittite *a*, and which Couvreur argued for. In this connection it is important to note that *-hh-* intervocally is consistently written, in spite of

⁴⁶ *Op. cit.*, p. 6.

⁴⁷ *Op. cit.*, p. 92.

⁴⁸ See his "Hittite evidence against full-grade *o*", *Language* 14.104-111, 1938; and discussed by Messing, *op. cit.*, pp. 219-220.

⁴⁹ *Mémoire*, p. 106.

⁵⁰ As for Sturtevant's translation of the active verb 'he goes to bed, he undresses', it is universally agreed that "Few will believe that the two (i.e., *nekuzi* 'it is evening' and *nekumanza* 'naked') are related in Indo-Hittite as Sturtevant claims, through the concept 'people take off their clothes' = 'night fall'" (Messing, *op. cit.*, p. 219, fn. 62).

⁵¹ See Sturtevant, *op. cit.*

the orthographic difficulties that the ill-adopted syllabic system for Hittite necessitates,⁵² although the one clear example which Couvreur found for intervocalic single writing, *lahu*, 'pours', appears more than once with *-hh-* for *-h-*. If such an orthographic contrast did exist it was apparently restricted to this single phonological environment. There is, further, nothing surprising in this orthographic contrast of single vs. double writing any more for the laryngeals, since it is now quite certain that the Hittite single vs. double writing of stops is a contrast of *lenis* vs. *fortis*, and related to the voiced vs. voiceless contrast of the other IE languages, although the same single vs. double writing of the continuants *r l m n s* is most probably non-distinctive.⁵³ Couvreur has related this orthographic contrast of single vs. double writing of stops to the *o*-colored vs. *a*-colored laryngeal, in which case the distinction between these is maintained orthographically only intervocalically (and necessarily after *a*, since IE **o* > Hitt. *a*) — *lahu* 'pours', Gk. λούω,⁵⁴ *pahhur*, Gk. πᾶρ. Messing has remarked

⁵² Couvreur discusses this question (*op. cit.*, pp. 189-194) in its historical relation to IE *A* vs. *Q*' but it is a good idea to separate orthographic evidence (more or less synchronic) in Hittite from assumptions about the number of laryngeals in IE, so as not to be circular, and to see all varieties of laryngeals in Hittite that are really not overtly there.

⁵³ This question of Hittite orthography will be more fully discussed in the Conclusion, where I hope to integrate this with the development of the laryngeals as a whole.

⁵⁴ The history of this word is difficult, and still not clearly elucidated, although the evidence in favor of an *o*-colored laryngeal still predominates, and is more convincing. Sturtevant has argued most strongly against Couvreur's assumption of an *o*-colored laryngeal, which the latter bases primarily on the single writing of *h* in Hittite (*op. cit.*, pp. 189-194). But Sturtevant's argument is solely the fact that three forms of Hitt. *lahu*- are spelled with *-hh-* rather than *-h-*, and he passes over the evidence for *o*-color or *a*-color in the other IE languages in an artificial manner. He describes Hitt. *lahuzi* as a non-thematic root present < **laxuti*, Lat. *lavit* as the regular development of a thematic present with full-grade vowel, i.e. < **lexweti*, and Gk. λῶω as *o*-grade. He does not comment on the expected length in the present stem in Latin, but merely puts the Lat. *a* = Gk. *o* vocalism into the *a/o* series, which is by no means established (*op. cit.*, 1938, pp. 107-108). Apparently aware of these difficulties, he describes (*op. cit.*, 1941, pp. 35-36) Lat. *lavit* as a Hindu accented *a*-class present, < **lawéti*, with *a* from *a*₁, but Gk. λῶει < **lowx-*. But Sturtevant has no regard for the established morphological distribution of ablaut *o* in IE, and his explanation of Gk. *-o-* seems artificial to me. Martinet assumes reduced (really zero) grade vocalism for both Lat. *lavit* and Gk. λούω (with *o* < *a*₁ as analogical from paradigmatic *ō*), but hesitates setting up a root **leA*™, because of the ante-consonantal diphthongs in many forms, all of which attest to a root consonant *u*. Pedersen, who shares Sturtevant's views against full-grade *o*, passes over the non-Hittite evidence. Since he assumes IE **-eE-*, **-eA-* > *ē*, *ā* regularly in Hittite before a consonant, he posits two separate original developments in Hittite: **loH₂we-* > *-āw-*, but **loH₂uC-* > *-ahhu-*. He assumes that single writing in such forms as *la-a-hu-wa-i* occurs after a long vowel, so that the laryngeal in these forms (which are regularly supposed to show *-āw-*) has gotten there by contamination with those which have regularly *-ahhu-*, but does not explain why the former show single *-h-* rather than *-hh-* (*op. cit.*, p. 189). Cowgill has examined the non-Hittite evidence more fully, and posits an IE root **lewH₃-* (but **leH₃w-* in Hittite, by metathesis), and which he justifies chiefly from such Greek forms as Mycenaean *re-wo-te-re-jo* 'bathubs', Hom. λοῦτρόν, λοέσσαι, etc., with the Mycenaean forms from an original **lewo-* < **lewH₃C-*, but **lowe* for **lewo* in the remaining, the latter as a result of a "morphological innovation" which he posits, but does not really explain. Lat. *lavit* is explained as **leweti* > **lower(i)* (with **ew* > *ow* in Italic and Celtic) and > *lavit*, with the shift of **o* > *a* before *w*, the precise conditions for which he admits are still not available. But such forms as Lat. *lautum*, OIcel. *laundr*, etc. must surely be from **lHwC-*, which makes his metathesis rather *ad hoc*. (See his "Evidence for laryngeals in Greek", *Evidence for laryngeals* 93-162, Werner Winter, editor (University of Texas, 1960), 115-117.)

that "But with reference to Couvreur's etymology *lahu-* 'pours' to Lat. *lavō*, Gk. *λούω* the fact that the verb forms may be spelled, THOUGH RARELY ARE, with *h̥h̥*, is not at all sufficient counter-evidence. Sturtevant forgets that intervocalically *h̥h̥* is infinitely more common, so that even a fairly consistent writing as *h̥* is sound proof".⁵⁵

Sturtevant further objects to de Saussure's original *Q*, since "The (second) difficulty with tracing Hitt. *h̥* to an *o*-colored laryngeal is the rather strong, although limited, evidence in favor of interpreting *h̥* in its second value as representing the glottal stop, that is, the laryngeal that had no influence upon vowel quality".⁵⁶ Sturtevant revises this objection in light of (1) the significance of the *h̥:h̥h̥* orthographic contrast in Hittite (but without Couvreur's historical assumptions about *A* vs. *Q*), and (2) those Hittite forms which sometimes show *h̥* for IE *E* (at least two of Sturtevant's etymologies, Hitt. *meḥur* 'time', Goth. *mēl* 'time', OE *maēl* 'measure'; and *šeḥur* 'urination, urine', OIcel. *sūrr* 'sour', *saurr* 'male semen', Lat. *sēmen*, show *h̥* for Möller's *E* intervocalically, but see §1.5) and sometimes no laryngeal (e.g., Hitt. *ekuzi*: Lat. *aqua*, etc.). Sturtevant accordingly analyzed intervocalic *-h̥-* as the voiced counterpart to *-h̥h̥-* (his *x* vs. *γ*), but as the reflex of an *e*-colored laryngeal (cf. *šeḥur, meḥur*; specifically his second *e*-colored laryngeal, the first — his *ʔ* — leaving no trace in Hittite orthography). Now Sturtevant's above objection is hardly an objection at all, since he merely refuses to interpret the Hittite laryngeals in view of the laryngeal theory, but prefers to make the Hittite laryngeals (or their orthographic representation) primary evidence for establishing (or keeping) an IE *o*-colored laryngeal. There is simply no justification for insisting that only if an IE *Q* had left a distinct orthographic trace in Hittite could its existence be established. If it turns out that Hittite writes IE *E* and *Q* similarly (with *h̥*), then there is only an orthographic contrast of *fortis* vs. *lenis* attested in Hittite (for which more in the Conclusion), which fits well into the distinctive feature oppositions that are becoming revealed for Hittite. Sturtevant, therefore, simply refuses to see Hittite single *h̥* as a reflex of an IE *o*-colored laryngeal, and this hardly constitutes proof for its non-existence. He accordingly explains the relevant Hittite cognates thus: "If, then, we refuse to derive the initial *h̥* of Hitt. *ḥaras, ḥark-*, and *ḥastai* from an *o*-colored laryngeal we must reconstruct the Indo-Hittite archetypes of Gk. *ὄρνις*, OIr. *orgaim*, and Lat. *os* as *xorn-*, *xorg-*, and *xost-*, or as *ʔorn-*, *ʔorg-*, and *ʔost-*".⁵⁷ Of the corresponding Hittite words *ḥaras* and *ḥastai* probably are also *o*-grade forms (IE *xor(n)-* and *xosti-* or *ʔor(n)-* and *ʔosti-*), but *ḥarkzi* 'is destroyed' may perfectly well be a full-grade form (IE *xárg-ti* or *Pérg-ti*)."⁵⁸ But Sturtevant's new reconstructions with *x* (his second *a*-colored laryngeal) or *ʔ* (really *γ*, his second *e*-colored laryngeal) present additional problems which he

⁵⁵ *Op. cit.*, p. 219. To state this differently, *-h̥h̥-* must be the (orthographically) marked pole of the contrast *-h̥h̥-/h̥-* in Hittite, so that it is not surprising to find the unmarked *-h̥-* less consistently written, rather than vice versa.

⁵⁶ *Op. cit.*, p. 109.

⁵⁷ Sturtevant should write *γ* here for his *ʔ*, of course, which is changed in his *Indo-Hittite laryngeals*, pp. 46-53.

⁵⁸ *Op. cit.*, p. 110.

ignores completely. If the initial laryngeal in Hitt. *ḫaštai*, *ḫaraš*, and *ḫark-*, is in fact an *a*-colored laryngeal, then it is just as surprising that there are no cognates in IE languages with initial full-grade *a* (from *xe-*) as there are no IE cognates with initial *e*; and Sturtevant's reconstructions with ablaut *o*, preceded by whatever laryngeal, are *ad hoc*, since it is precisely the occurrence of anomalous *o* (in cognates, as well as morphological categories where it does not belong), that induced de Saussure to posit *Q* in the first place. His alternative reconstructions with *ʔo-* (i.e. *γo-*) are equally unconvincing, since there is limited, but excellent, evidence that ablaut *o* (preceded originally by an *e*-colored laryngeal in IE) is represented orthographically in Hittite as *a-*, not as *ḫa-*: e.g., Hitt. *arraš* 'anus', Gk. ὄππος; Hitt. *aššuš* 'good', Gk. εὖς.⁵⁹ His conclusion that "One must further assume either full-grade *a* or full-grade *e* beside Gk. ὄρνις 'bird', OIR. *orgaim* 'I destroy', Gk. ὀστέον 'bone', and perhaps beside Lat. *opus* 'work'", is completely unfounded. It is certainly not a substitute for viewing the Hittite forms *ḫaštai*, *ḫark-*, and *ḫaraš* as additional proof for de Saussure's *Q* in Gk. ὀστέον, OIR. *orgaim* and Gk. ὄρνις and therefore represented in Hittite initially as *ḫ*.⁶⁰

1.5. We discuss now the Hittite evidence concerning the IE *e*-colored laryngeal, and examine Sturtevant's proposal that Hittite shows sufficient evidence to warrant postulating two *e*-colored laryngeals, the additional one covering those correspondences which show *ḫ* in Hittite (since Sturtevant assumes that the lack of any orthographic representation for Möller's *E* is the more normal situation in Hittite). This question is somewhat more difficult than the preceding, since it is based on particularly unconvincing etymologizing on the part of Sturtevant. Nevertheless those etymologies established to show that the IE *e*-colored laryngeal is not orthographically present in Hittite are, on the whole, more secure than those which Sturtevant invoked to show that an IE *e*-colored laryngeal might also be represented in Hittite by *ḫ* (his *γ* or second *e*-colored laryngeal). It must also be pointed out that, as opposed to the Hittite evidence for two *a*-colored laryngeals, there is no single phonological environment in which a contrast of Hitt. *o* vs. *ḫ* might be well established. We consider the evidence in Hittite in initial position before a vowel first.

There is good evidence that *E* is not represented before full-grade *e* in Hittite: Hitt. *ekuzi*, 3rd plural *akuwanzi* 'drink', OIcel. *æger* 'sea', Goth. *ahva*, Lat. *aqua* 'water'; Hitt. *epzi*, 3rd plural *appanzi* 'take; marry; begin', Skt. *āpnōti* 'obtain', OLat. *coēpī* 'I began', *apīscor* 'attain'; Hitt. *ešzi*, 3rd plural *ašanzi* 'set', middle *ešari* 'remain', Skt. *āste*, Gk. ἥσται; Hitt. *ešzi*, 3rd plural *ašanzi* 'be'; Hitt. 1 sg. *edmi*, 3rd plural *adanzi* 'eat', Skt. *ātti*, Gk. future ἔδομαι, Lat. *edō*, etc.⁶¹ Hendriksen appears to

⁵⁹ Cf. Messing, *op. cit.*, pp. 210, 216; Couvreur, *op. cit.*, p. 98.

⁶⁰ Couvreur offers as additional cognates for an *o*-colored laryngeal in Hitt. *ḫulla-* 'smite', Gk. ὀλλομι 'slay'; and *ḫumant-* 'all, whole', Lat. *omnis* 'all', but since he cannot explain the vocalism of the Hittite words, they should be rejected. Cf. Messing, *op. cit.*, p. 217.

⁶¹ The evidence is summed up in Sturtevant, *op. cit.* (1941), pp. 53-56.

oppose considering all such examples in Hittite as not simply representing an original *E*, but his alternative proposals are not convincing. He suggests that the lack of initial *h*- in Hitt. *edmi* and *ekuzi* can be explained just as well as either loss of original *h*- in Hittite through analogy with the plural (zero-grade) forms, or the direct reflexes of ablaut forms **eHd-*, **eHk^w-*, and therefore with regular loss of the laryngeal before a stop⁶² (although Hendriksen's ablaut forms serve only to get the laryngeal before the final stop of the root). Since Hendriksen is willing to accept that initial *E* is simply not represented in Hittite in some forms, it is difficult to understand why he insists on a separate treatment for *ekuzi* and *edmi*, since his explanations concerning these are certainly more ad hoc than to state that initial *E* is not represented in Hittite. The evidence presented by Sturtevant to prove that an additional *e*-colored laryngeal shows *h* in Hittite includes only two really plausible examples:⁶³ (a) Hitt. *ḫekur* (written *hé-kur*, *hé-gur*) 'summit, stronghold', Skt. *ágram* 'point, tip', also *girīḥ* 'mountain', Gk. *δεῖράς* 'ridge', all from an IE **Hg^wer(i)-*. This is more probable than Pedersen's suggestion that *ḫekur* be related to Gk. *ὄκρις* 'prominence', Skt. *ácriḥ*, OLat. *ācer* 'sharp, pointed'.⁶⁴ The single writing of the velar stop in Hittite indicates an IE voiced rather than voiceless stop, and the Gk. *a/o* variation (which Pedersen explains as reduced grade and *o*-grade respectively, from IE *E*), is not so easily separated from the problem of IE *o*-grade adjacent to *A*. I think that Sturtevant's etymology is correct, but in any case this is hardly incontrovertible evidence for an *e*-colored laryngeal. The mere fact of Hitt. *ḫe-* is no proof, since there is not enough evidence to take this sequence for granted (i.e. from IE **Ee-*). (b) *ḫenkan* 'fate, destiny', Gk. *ἄν-ἄγκη* 'fate, destiny'. Pedersen's original etymology is taken up by Sturtevant. They derive the Old Irish and Welsh forms from IE **ḡkenā-*, and assume that Hitt. *ḫ-* must be *E* because of the Hittite vocalism. Benveniste adds the Gk. *ἄν-ἄγκη* as additional evidence for non-Hittite *a*-color (he includes the Old Irish and Welsh forms as well), and assumes the root to be **ə₂enk-*, not **ə₁enk-*.⁶⁵ I think that there is, then, at least some evidence for *a*-color for this root, and Messing's criticisms of Benveniste — that there are Greek forms without prothesis, *véκταρ*, *véκυς*, and that the Hittite forms show *-e-* but not *-a-* after the initial laryngeal — are not serious. Greek prothesis is rightly related to an initial antekonsonantal laryngeal, but the matter is not so clear that one can expect a prothetic vowel in every case from an IE *HR-* sequence, so that again only Hitt. *ḫe-* remains the sole evidence for an *e*-colored laryngeal, which is precisely what one is trying to establish.

Medially in Hittite adjacent to a stop (or stops) the development of IE *E* is clearer in those examples where *E* leaves no trace in Hittite, than in those examples which

⁶² *Op. cit.*, pp. 51, 61.

⁶³ All the evidence is *op. cit.*, pp. 49-51.

⁶⁴ See Pedersen, *op. cit.*, p. 183. He suggests the possibility of Hitt. *ḫekur* = Skt. *ágram* as well, however.

⁶⁵ See Pedersen, *ibid.*; Benveniste, *Origines de la formation des noms en indo-européen* (Paris, 1935), pp. 154-155; Messing, *op. cit.*, p. 192, fn. 8. Couvreur's proposed connection with Lat. *aeger* 'sick' *op. cit.*, pp. 122-138, is certainly forced, and not accepted.

Sturtevant adduces to show *-h-* from his γ (second *e*-colored laryngeal):⁶⁶ (a) Hitt. *ekuzi*, 3rd plural *akuwanzi*, Goth. *ahva*, OIcel. *æger*; (b) Hitt. *epzi*, 3rd plural *appanzi*, Skt. *āpnōti*, OLat. *coēpī*, *apīscor*; (c) *ešzi*, *ašanzi*, Skt. *āste*, Gk. *ἤσται*; (d) Hitt. *dāi*, 3rd plural *tiyanzi*,⁶⁷ etc. Such examples prove (as many of those showing no *h* for IE *A*) that the laryngeals were lost universally in certain positions, generally before and after stop consonants.⁶⁸ Of the etymologies adduced by Sturtevant to show that Hitt. *h* reflects an *e*-colored laryngeal as well (including now the intervocalic position), the following are those that are the clearest: (a) *pehute-* 'lead away, conduct', *uwate-* 'bring', with initial preverbs *pe-* 'thither' and *u-* 'hither', OCS *vedq vesti* 'lead; marry (a woman)', OIr. *fedid* 'guides'. Sturtevant reconstructs the IE root as *γwed-* (but ending in *-dh-* if Skt. *vadhūh* 'young woman' is included) in spite of Gk. *ἔδov*, plural *ἔδva* 'bride price', which according to Austin's theories concerning the alternation of prothesis with rough breathing in Greek,⁶⁹ would require initial IE *x* rather than γ . Sturtevant rejects the traditional etymology with Gk. *ἔδov*, however, solely on the basis that the Hittite word shows *h* written singly between vowels, and the immediate juxtaposition of *-e-* and *-h-*. We have already mentioned that single *h* in Hittite is not a proof of an IE γ phoneme, and the *e* adjacent to Hitt. *h* here is part of the preverb, so that the lack of vowel-color in this example proves nothing. (b) Hitt. *išhāi* 'bind', Av. *yāsta-* 'girt', Gk. *ζωστός* 'girt'. Semantically and phonetically it is preferable to relate this word with Skt. *syāti*, Gk. *σέω* 'bind'.⁷⁰ Sturtevant repeats Couvreur's objection that the equivalence of an older Luwian 3rd plural *hi-iš-hi-ya-an-ti-iš* with Hitt. *iš-hi-ya-an-ti* (nom. plural participle) in the same text proves that initial *i* in Hittite here is not a graphic device for writing the initial consonant cluster nor a secondary development before *šh-*. Couvreur is generally not followed here. There can still be the possibility that the *i-* of *išhāi*, if really internal to the root, comes from the paradigm *išhya/e-*: Luwian *hišhya/e-*, in which case a thematic reduplicated present. There is no evidence for the development of the laryngeals before an inherited IE *i* in Hittite to make the lack of an initial laryngeal here crucial in Hittite. Sturtevant himself proposes dissimilative loss of the initial *i* in *išhya/e-* beside Luwian *hišhya-*, since he believes that *h* before IE *i* ought to be written in Hittite because of its occurrence before *u*. As for Sturtevant's claim that we are dealing with an *e*-colored laryngeal

⁶⁶ See Sturtevant, *op. cit.*, pp. 53-55; Crossland, *op. cit.*, pp. 110-114. Couvreur, of course, finds nothing difficult in the absence of *h* in such examples, since he insists that IE *E* is not represented in any position in Hittite, nor Pedersen either, who believes that **-eE-* gives only *ē* in Hittite.

⁶⁷ This example, Hitt. *dāi*, and also Hitt. *nāi*, Skt. *náyati*, is difficult since it is part of the general evolution of the diphthongal *hi*-conjugation stems, and which is discussed in § 1.6. For full paradigmatic forms, see Friedrich, *op. cit.* (1960), pp. 101-102, Sturtevant, *op. cit.* (1951), pp. 163-164.

⁶⁸ See Hendriksen, *op. cit.*, pp. 50ff.; Pedersen, *op. cit.*, pp. 184-190; Crossland, *op. cit.*; Puhvel, "Hittite evidence for laryngeals", *Evidence for laryngeals* 163-172, Werner Winter, editor (University of Texas, 1960), pp. 164ff.

⁶⁹ See his "The prothetic vowel in Greek", *Language* 17.83-92 (1941); and also Chapters 2 and 6 for discussions concerning these theories.

⁷⁰ This etymology was proposed by Kuryłowicz, *op. cit.* (1927), p. 101, is accepted by Friedrich, *Hethitisches Wörterbuch*, p. 86, and is disputed only by Couvreur and Sturtevant. Cf. also Hoenigswald, "Laryngeals and *s* movable", *Language* 26.182-185 (1952), 184.

here, he bases that on the rule that only IE γ shows metathesis from $-\gamma s-$ to $-z\gamma-$ in Hittite, which is of course necessary if the relation of *išhāi* with $\zeta\omega\sigma\tau\acute{o}\varsigma$ were retained. But since this is one of the prime etymologies which he cites for this metathesis, this rule cannot be invoked here as evidence for an e -colored laryngeal, and remains doubtful therefore for his remaining examples of it. (c) Hitt. *erhaš* 'boundary', Lat. *ōra*, Skt. *ārat* 'from afar'. Sturtevant's reading of the initial vowel is puzzling, since there is no alternant form *irhaš* to assume that it is here a question of a change of older $*e > i$, especially since the etymology is questionable. Couvreur casts serious doubts on Sturtevant's etymology, and believes that it is probably not IE.⁷¹ Only Sturtevant's interpretation gives evidence of an e -colored laryngeal, since he posits a metathesis of $-\gamma r- > -r\gamma-$ on the analogy of $-\gamma s- -z\gamma-$. (d) Hitt. *ešhar*, Gk. $\epsilon\alpha\rho$, Skt. *āsṛk*, Lat. *aser* 'blood'. The etymology is certainly correct, but Sturtevant reconstructs $*Eeyzr$ rather than $*EesHr-$ and points again to metathesis of $-\gamma r- > -r\gamma-$ as evidence of an e -colored laryngeal.

Three of Sturtevant's favorite etymologies show h intervocalically: (a) *weh-*, $\acute{u}-e-i\acute{h}-\acute{h}i$, 3rd plural *wa-ḥa-an-zi* 'turn, fall', Skt. *ūtāḥ* 'woven', infin. *ótum*, Lith. *áudžiu áusti* 'weave'. This etymology is much disputed, and semantically it seems far-fetched,⁷² and the IE cognates show no independent evidence for an e -colored laryngeal in any case. (b, c) Hitt. *šeḥur* 'urination, urine', OIcel. *saur* 'impurity, filth', *sūrr*, 'sour, unpleasant', Lat. *sēmen* 'seed'; and Hitt. *meḥur* 'moment, occasion', Skt. *māti* 'measure', Lat. *mētior* 'measure', Goth. *mēl* 'time', OE *mael* 'measure, point of time'. Couvreur does not accept these etymologies⁷³ (and is followed by Messing⁷⁴), but his objections, in each case semantic, do not seem convincing. I think that Messing is perhaps right in separating the Latin cognates ('seed', 'sow', 'semen', etc.) from the Old Icelandic, where the original meaning is 'sour' or 'filth' associated with some naturally sour place, such as bogs or swamps, but the relation of *šeḥur* to the Old Icelandic forms is certainly probable enough. Couvreur objects as well to the fundamental difference between the meaning of *meḥur*, which he gives as 'occasion', even 'opportunity', and the German *mal* and its cognates, 'time, measure', but the difference hardly seems fundamental. Both Hittite ('favorable moment of time', i.e., 'opportunity') and Gk. ($\mu\eta\tau\iota\varsigma$ 'wisdom, skill', $\mu\eta\tau\iota\omicron\mu\alpha\iota$, $\mu\eta\tau\iota\acute{\alpha}\omicron\mu\alpha\iota$ 'consider, plan', i.e., 'to measure' not in a physical sense, but 'to judge') show different specialized meanings from the German cognates. I am therefore inclined to see Hittite h in the last two examples as evidence of an IE e -colored laryngeal. From the preceding discussion of Sturtevant's evidence for postulating two IE e -colored laryngeals (h and σ in Hittite), the following conclusions can be asserted with reasonable certainty: (1) There is reasonably good evidence for Hittite orthographic representation of an e -colored laryngeal by h only in intervocalic position, in which examples independent

⁷¹ Couvreur, *op. cit.*, pp. 150-151.

⁷² Cf. Messing, *op. cit.*, p. 220; Couvreur, *op. cit.*, p. 211.

⁷³ Couvreur, *op. cit.*, pp. 203-204; p. 240.

⁷⁴ Messing, *op. cit.*, p. 211.

(i.e. non-Hittite) evidence is available for *e*-color. (2) In the remaining examples either Sturtevant's etymologies must be abandoned or Hittite sequences *he-*, *-eh-* cannot be correlated with independent evidence for *e*-color in the other IE languages. This means that there is yet no satisfactory non-ad hoc interpretation of such sequences in relation to the other IE languages (Couvreur says simply that *-eh-* must be non-IE.⁷⁵ But this explanation is too simple, since it really avoids the issue). (3) As for Hittite evidence for two *e*-colored laryngeals, this could be postulated only by assuming (really insisting) that the development of the IE laryngeals in Hittite must be interpreted in terms of unconditioned sound change only, whereas it turns out that, by examining the orthographic representation and distribution of the laryngeals in Hittite, it is clear that the laryngeals were universally lost in certain environments — generally before and after a stop.⁷⁶ This allows one not only to confirm the assumptions about IE *E* in Hittite, but in addition to integrate the loss of the laryngeals in certain positions within the evolution of Hittite phonology from PIE as a whole.⁷⁷ It is crucial to note, finally, that not one of Sturtevant's etymologies, should it be correct, would in any way furnish evidence in Hittite for a case of $\emptyset < E$ that could not be understood as conditioned loss in such specified phonological environments.

1.6. We have put aside discussing Hitt. *nāi*, 1 sg. *nehhi*, 2nd sg. *nāitti*, 3rd plural *neyanzi* 'lead, send, turn', and *dāi* 1 sg. *tehhi*, 2nd sg. *dāitti*, 3rd plural *tiyanzi* 'to place', which Sturtevant claimed showed additional evidence for *P* (i.e., his first *e*-colored laryngeal), because these examples cannot be discussed apart from the history of the

⁷⁵ Couvreur, *op. cit.*, p. 211.

⁷⁶ We will not discuss the individual etymological evidence which Sturtevant set forth for a second IE *a*-colored laryngeal for those cognates in Hittite which do not have *-h(h)-*, since both the arguments and the conclusions are the same as those presented concerning two *e*-colored laryngeals. The evidence is summed up in Sturtevant, *op. cit.* (1942), pp. 42-46, and is discussed by Crossland, *op. cit.*, pp. 114-120, where he concludes that the evidence presented by Sturtevant must be explained as either the conditioned loss of the laryngeals adjacent to stop consonants — e.g. *tittami* < **titHomi*, Skt. *tiṣṭhāmi*; *taizzi* 'steals', Skt. *(s)tāyūh* etc. — or as instances of shwa primum, i.e., IE **H* — e.g., *maklant* 'thin', Lat. *macer*, but full-grade in Gk. *μακρός*, etc. Even the most convincing etymologies involving the possibility of two *a*-colored laryngeals are now doubtful. Sturtevant himself rejects *alpas* 'cloud', Lat. *albus* 'white', Gk. *ἀλφός* 'dull white leprosy', as a positive instance of his *P* (*op. cit.* 1942, p. 58), and Friedrich does not mention the etymology (*op. cit.* 1952-1957, p. 20); also *appa* 'back, behind' is now more usually connected with Gk. *ἐπι-, ὀπι-* (*ὀπισθεν*) than with Gk. *ἄπῳ*, for which see Couvreur, *op. cit.*, pp. 94-96, 153-155; Friedrich, *op. cit.* (1952-1957), p. 25; W. Wyatt, Jr., "Structural linguistics and the laryngeal theory", *Language* 40.138-152 (1964), 149. Kuryłowicz was the first to suggest the possibility of two *a*-colored laryngeals for IE ("Quelques problèmes métriques du Rigveda", *Rocznik orientalistyczny* 4.196-218 (1928), p. 216), and his arguments are summed up in *op. cit.* (1935), pp. 30, 75, where he has suggested the interesting non-Hittite parallel to two IE *a*-colored laryngeals, such that Indo-Iranian aspiration = Hittite \emptyset , not *-h(h)-*. But his evidence — e.g. 2nd sg. perfect ending Hitt. *-(t)ta*, Skt. *-tha-* includes those examples where there can be no doubt of conditioned loss of the laryngeals. This is precisely why "... on ne possède pas d'exemples hittites *occlusive* + *h* correspondant à une sourde aspirée indo-iranienne" (*Ibid.*, p. 75).

⁷⁷ See the Conclusion for more of this.

diphthongal stems of the *hi*-conjugation as a whole.⁷⁸ The evolution of this verbal category is still a complex question of Hittite morphology, and no solution which has been proposed to date is wholly acceptable and without at least some objections, but I think that it is clear that this verbal category does not give sufficient evidence for increasing the number of IE laryngeals, as both Sturtevant, and more recently Puhvel, have argued. It is with this last consideration that the following discussion is concerned. The paradigmatic features of the diphthongal stems (this term of Sturtevant is not accurate historically or descriptively) are a characteristic ablaut vocalism in the singular between *e* in the first person and *āi* in the remaining persons, and what is generally described as a suppletive (although this term is historically oriented for those who see **-iye/o-* extension rather than a purely inherited vocalism) plural, formed with the *-iya-* thematic suffix and generally suffixed to the shortest form of the stem. The same distinction in plural and singular formation is characteristic of the Hittite perfect as well as the present. Historically it has to be admitted that at least two types of root formation underlie the diphthongal stems: *CeH-*: e.g. **dheH-*, Hitt. *dāi*; and *CeiH-* and *CeHi-*: e.g. **neiH-*, Hitt. *nāi*, Skt. *náyati*; **seHi-*, Hitt. *išhāi*, Skt. *syāti*, and therefore roots with inherited IE **-i-* as part of the root, and those without inherited **-i-*.⁷⁹

Sturtevant assumed that the lack of laryngeals in the Hittite orthography in those verbs of the *hi*-conjugation such as *dāi*, etc., could be accounted for only by positing an additional *e*-colored laryngeal which disappeared in Hittite as opposed to *γ*, which is orthographically *h*. His explanation for these forms is contained in the following crucial passages: "If ... we set up IH 1 sg. *noʔyxe*, we get in Hittite (with loss of *ʔ* and contraction of *o* and *y* to diphthong *oy*, which yielded Hitt. *e* ...) the recorded form *ne-iḫ-ḫi[nexi]*." "If we similarly set up IE 3 sg. *noʔye*, we may derive Hitt. *na-a-i* by change of *o* to *a* and contraction of *i* from IE *y* ...⁸⁰ Sturtevant is unclear as to the outcome of the IE laryngeals in these forms, and his explanation seems rather *ad hoc*. Crossland has interpreted this passage as stating a change of **oy* > *e* in polysyllabic forms and **oy* > *ai* in unisyllabic forms with compensatory lengthening in the latter.⁸¹ Sturtevant's proposed development of the IE long diphthongs to *ai* in Hittite is not proven,⁸² and the fact that compensatory lengthening has to be invoked

⁷⁸ See Sturtevant, *op. cit.* (1951), pp. 163-164; Friedrich, *op. cit.* (1960), pp. 101-102 for paradigmatic examples of the *hi*-conjugation diphthongal stems. See Sturtevant, *ibid.*, pp. 136-138; E. Risch, "Zu den hethitischen Verben vom Typus *teḫhi*", *Corolla linguistica* 189-198 (Wiesbaden, 1955); Puhvel, *op. cit.*, pp. 55-56; Crossland, *op. cit.*, pp. 110-111, for considerations of the evolution of the diphthongal stems, and from which the following discussion is drawn.

⁷⁹ I do not think that the comparative data warrants excluding either roots with inherited IE **i*, as Risch, *op. cit.*, and Puhvel *op. cit.* attempt, nor certainly primary roots ending in *H*, about which latter Sturtevant had only the following to say: "We must either recognize a formative *i* or assume that the verb (i.e., Hitt. *dai* 'places') was partially assimilated to stems like IH *neʔi-* in pre-IH times. Certain it is that in Hitt. it belongs to the same conjugation class as *nai-* 'lead', *pai-* 'give' ..." (*Op. cit.* 1942, p. 55).

⁸⁰ *Op. cit.*, (1951), p. 137.

⁸¹ *Op. cit.*, p. 111.

⁸² Sturtevant, e.g., sets up an IH *Aoys*, *Aysos* for Hitt. *aiš*, gen. *iššaš*, Lat. *ōs*, *ōris*, Skt. *āḥ*, *āsāḥ*, i.e., an IH root with an inherited long diphthong, although there is simply not a shred of evidence in

only in certain morphological environments is hardly convincing. That is, vowel lengthening of the laryngeals ought to be as phonologically regular in the first person as in the third, so that a conditioning in terms of number of syllables is really begging the question. But since the loss of the laryngeals in the consonantal environments reconstructed by Sturtevant (including the more acceptable reconstruction of Hitt. *nāi* as **neiH-*, i.e., as a true set base) is now beyond question a phonologically conditioned process, there is no compelling reason of any kind to postulate an additional laryngeal for these forms, even aside from the obvious arbitrariness of his explanation.

Risch has attempted to show that such Hittite paradigmatic oppositions as *dāi* vs. *tiyanzi*, *pāi* vs. *piyanzi*, etc., as well as nominal oppositions such as nom. *zahḫaiš* vs. gen. *zahḫiyaš*, *aiš* vs. *iššaš*, Lat. *ōs*, show inherited IE ablaut variations rather than **-iyo-* extensions. Thus Risch posits a development of IE **e/oH₁* > Hitt. *ai*, and a subsequent conditioned change of **ai* > *e* before *-hhi*, as well as *H₁* > *i(y)*. Puhvel has shown that the *a*-vocalism of all verb stem types considered here corresponds to the *o* of the strong forms of the IE perfect so that only the sound change of IE **oH₁* > *ai* is relevant to the diphthongal stems. The objections to these proposals are clear: (1) A conditioned shift of **ai* > *e* before *-hhi* seems arbitrary, especially since there is not enough evidence to know if *-hhi* is morphologically or phonologically relevant; (2) there is also a certain amount of arbitrariness and lack of agreement about the development of **H₁* > *i(y)*, since Puhvel and Risch do not agree as to the extent of this development. Nonetheless this explanation does serve to formally link the development of IE roots with original *i* with primary verbs with secondary *i* from *H₁* in Hittite, and also to provide, as Puhvel has remarked, a basis for the resemblance to verbs in *-iya-* which the diphthongal stems show. But the only evidence that then remains that is concerned with the development of the laryngeals is (1) a change of **oA₁* > *ai*, and (2) a change of **H₁* > *i(y)*. As Cowgill has stated, "... Risch's material, while convincing for a Hittite (Anatolian?) development ... does not directly imply the same development in other Indo-European languages. Nor does it favor a splitting of the non-coloring laryngeal into two: the cognates of such a root as *dāi-* show no excrescent *i*'s or *y*'s, and Hittite words with *e* from **VE* like *meḫur* 'time' can now be explained as containing **eE*".⁸³ Puhvel's scheme of four positions of 'laryngeal' articulation, *E^v E A A^w* (all voiceless) can therefore be reduced to three: *E* (= *H₁*), *A* (= *H₂*) and *A^w* (= *H₃*). The remaining four laryngeals of his inventory, i.e., the voiced counterparts to the above, are based on either insecure etymologizing (e.g., *ḫekur* vs. *ešzi*, *ḫanti* vs. *appa*, which we have discussed), or what is really now conditioned phonological loss of the laryngeals (e.g., *dāi*, with the reflex of **-oH₁-* medially, vs. *meḫur*, with the reflex of **-eH₁-* medially).

the other IE languages that the root in question in fact contained a *y*-diphthong. Thus a change of IE *ōy* > Hitt. *ai* for this form at least is out of the question.

⁸³ W. Cowgill, Review of Puhvel, *op. cit.*, *Language* 39.248-269 (1963), 267. Cowgill discusses in this review also the additional evidence which Puhvel proposes for a possible contrast in IE of *E* and *E^v*, which he does not find convincing.

PHONOLOGICAL THEORIES OF THE INDO-EUROPEAN LARYNGEALS

2.0. A complete examination into the phonological basis of the laryngeal inventory has generally occupied only a secondary position in laryngeal studies. The most detailed and methodologically rigorous attempt toward a solution of this problem is certainly Lehmann's consideration of "The allophones of the laryngeals".¹ What is surely required for the phonological identification of the IE laryngeals is a methodologically rigorous framework within which the problem can be treated, rather than the kind of phonetic speculation characteristic of the early writings on the laryngeals.

2.1. The general problem of identifying reconstructed phonemes is in a large sense already provided for within the scope of the comparative method, and seldom raises problems additional to those involving the phonemic interpretation of the writing systems which underlie the significant correspondence sets of related languages. While it is true that "reconstruction procedures serve only to identify the number of contrasting entities in the proto-language",² reconstructing phonemic entities can hardly be removed from reconstructing the distinctive features which underlie reconstructed phonemes, and which can be determined from orthographic practices. For example, IE **p* is usually considered voiceless, bilabial, and non-continuant simply because the majority of languages from which this proto-phoneme was reconstructed could all be said with relative certainty to contain these distinctive features.

This dependence of the comparative method on the orthographic and phonological facts of related languages is to a large degree built into the very operations of the comparative method. The most formal presentation of comparative procedures is to

¹ See his *Proto-Indo-European phonology* (Austin, 1952), Chapter 14: "Allophones of the laryngeal consonants". Lehmann, however, is not concerned at all with postulating predictable (allophonic) features of the laryngeals or rarely even redundant features in the sense of Jakobson-Halle (*Fundamentals of language* (The Hague, Mouton, 1956), p. 9), but with their principal contrastive features. Lehmann thus postulates voice vs. voicelessness and labialization vs. non-labialization for *χ* (*H*₂) and *γ*^w (*H*₃).

² H. Hoenigswald, *Language change and linguistic reconstruction* (Chicago, 1960), p. 134.

be found in Hoenigswald, where the truth of this statement can easily be seen. Hoenigswald proposes that only correspondence sets in complementary distribution among related languages which show PARTIAL LIKENESS (i.e., languages in which at least one language shows neither phonemic merger nor split) can be grouped into the same proto-phoneme.³ More generally, this proposal leaves no room for a solution in which some phonemes W (+ e) and X (+ o) in language A can be grouped together with some phonemes Y (+ e) and Z (+ o) in language B to give the proto-phoneme P since neither language A nor B has preserved the same (proto-) phoneme in both prevocalic environments.

To advocate comparative methodology without such a restriction of partial similarity of correspondence sets would be to invite as many problems as synchronic phonemic analysis would have without a restriction of phonetic similarity. As a result, however, the proto-phonemic systems of reconstructed languages are seldom very much removed from the most archaic of the related languages. This is, of course, part of the inductive procedures of the comparative method. There are, for example, an infinite number of possible phonemic inventories of PIE which could, by a more or less complicated set of rules, predict the phonological systems of the various IE languages. PIE phonology, on the other hand, has persistently remained to only a slight degree different from the phonology of Vedic Sanskrit. But it is this very conservative, and thoroughly inductive approach to reconstructed phonology, which guarantees the possibility of a phonological interpretation of proto-phonemic systems.

2.2. The laryngeal theory has therefore had to do without the benefit of the comparative method, at least as far as determining the underlying phonological features of these consonants. Only Hittite has consistently preserved direct consonantal reflexes in the cuneiform orthography, the exact number and orthographic value of which are still a matter of dispute. The only additional direct evidence available to Indo-Europeanists concerning the phonological nature of the laryngeals are the (largely) assimilative sound changes which they have produced, sound changes both disparate in phonetic effect and frequently isolated within particular linguistic isoglosses. There is little need here to stress the importance of componential analysis with regard to the investigation of the kinds of phonetic components which can be isolated in the various IE languages as caused by the laryngeals. Componential analysis, as Watkins has suggested, provides a kind of middle ground between the earlier phonetically speculative theories concerning the laryngeals, and the later purely algebraic or notational approaches to the question.⁴ But componential analysis is to a degree phonologically arbitrary unless it is part of some more general theoretical view of phonological systems. In short, componential analysis need not necessarily presuppose a typological system such as distinctive feature theory.

³ "The principal step in comparative grammar", *Language* 26.357-364 (1950).

⁴ C. Watkins, "Componential analysis of laryngeals", *Evidence for laryngeals* 232-238, Werner Winter, editor (University of Texas, 1960), p. 233.

The groundwork of historically related phonological systems can best be described in terms of distinctive feature theory. This is so because it permits the linguist to speak of phonological systems without forcing him to give other than systematic phonetic equivalents for reconstructed phonemes (which is a question apart from that of attempting to discover the predictable features of allophones).⁵ IE **t* — a voiceless, interrupted, acute, diffuse stop, e.g., requires no phonetic decision about exact point of articulation (gingival, dental, or alveolar), about the realization of the voiced/voiceless contrast when simultaneous with non-continuant consonants (voiced/voiceless or tense/lax?); and in the case of only a single postulated series of stops and fricatives, the decision as to which sets are realized as mellow and which as strident. Such reconstructed protophonemic systems are rather inventories of some necessary number of opposed phonemic units interpreted in terms of distinctive features, which are extrapolated from both the known phonological facts of the various related languages, and from typologically valid universal implications inherent in distinctive feature theory, which permit phonological arguments far removed from those based on phonetic plausibility, asymmetry of the vocal organs, physiological economy, and the like. What has still to be accomplished in the methodology of determining the distinctive feature system of proto-phonemic systems is to allow all of the universal laws inherent in distinctive feature theory to act as the necessary guide to the plausibility (and hence acceptance) of one reconstruction over another. Or as Jakobson has stated: "A conflict between the reconstructed state of a language and the general laws which typology discovers make the reconstruction questionable".⁶

2.3. The evidence available for the phonological interpretation of the IE laryngeals, aside from Hittite orthographic practices, is limited to the (largely assimilative) sound changes caused by the laryngeal phonemes that can be pointed to with any certainty. Other sound changes, to which are ascribed rather complex morphological developments, are less reliable as evidence since they presuppose a particular distinctive feature system for the laryngeals which is not always phonologically plausible. Supplementary evidence in the way of both IE and non-IE phonological parallels has also been brought to bear on the problem, although generally without the necessary typological inferences which must be shown to hold between the two kinds of data. This evidence suggests a useful enough classificatory framework in which to discuss the major theories concerning the phonological interpretation of the laryngeals: (1)

⁵ The term systematic phonetics was first proposed by N. Chomsky, "The logical basis of linguistic theory", *Preprints of papers for the Ninth International Congress of Linguists* (Cambridge, 1962), pp. 536-538, and most recently in the *Handbook of mathematical psychology*, Volume II, Luce, Bush, Galanter, editors (John Wiley and Sons, Inc., 1963), pp. 307-310. Systematic phonetics is a universally oriented and finite phonetic classification of which the only example in linguistics is Jakobson's distinctive feature theory. Its historical usefulness is that it allows discussion about reconstructed phonemic systems in terms of general sound properties, but without necessitating actual physical records, and this in addition to the typological claims inherent in it.

⁶ R. Jakobson, "Typological studies and their contribution to historical comparative linguistics", *Proceedings of the Eight International Congress of Linguists 17-24* (Oslo, 1958), p. 23.

algebraic formulations; (2) diachronic phonological considerations, which subsume the assimilative sound changes attributed to the laryngeals; (3) synchronic phonological hypotheses, where more or less hypothetical distinctive feature systems are made the basis of IE structural changes; and (4) the use of non-IE parallels, the Semitic evidence playing the only important role, and which evidence is treated completely in Chapter 3. There is clearly overlapping in these categories, since more than one kind of argumentation is often present in the same system, but nonetheless the list is exhaustive enough in showing the different approaches that have been taken as far as the phonetic nature of the laryngeals is concerned.

2.31. The algebraic or functional school, composed mainly of de Saussure, Benveniste, Kuryłowicz, and Puhvel in his earliest writings,⁷ holds the least interest in this examination of phonological interpretations of the laryngeals, since their work has not required any precise phonological description of the laryngeals. Although de Saussure himself provided the basis for those linguists who were later to use the vowel-coloring effect of the laryngeals as the main evidence for their interpretation, by transcribing \mathcal{H}_3 as \mathcal{Q} and \mathcal{H}_2 as \mathcal{A} , and thereby singling out their vowel-coloring effect on the adjoining vocoid articulation as paramount, he was interested only in their functional aspect as *coefficients sonantiques* in the ablaut system of Pre-IE. The following statement, however, does occur in the *Mémoire*, explicitly referring to the INHERENT vowel-coloring aspect of the laryngeals: "... de ce fait on doit inférer que le phonème \mathcal{A} , en se fondant dans la liquide, lui avait communiqué, dès la période proethnique, une couleur vocalique particulière dont le r bref est naturellement exempt".⁸ One must not conclude, however, that de Saussure had no phonetic properties in mind in the purely morphophonemic significance he attaches to the laryngeals. Considering the principle by which the IE root cannot end in sequences of *in*, *ir*, except when the first sonant includes the laryngeals, de Saussure remarked that "... ici semble cesser le parallélisme de \mathcal{A} avec les autres coefficients sonantiques, parallélisme qui du reste considéré au point de vue physiologique est assez énigmatique".⁹ A somewhat more direct clue to de Saussure's phonological view of the laryngeals can, unfortunately, be gotten only from a single passage in the whole *Mémoire*, in the discussion concerning the reflexes of the IE long syllabic sonants: "Je comprends celle (i.e. la mutation) de $r^{\mathcal{A}}$ en \bar{r} : c'est à l'origine une prolongation de l' r durant l'émission du \mathcal{A} . Pareil phénomène semble impossible quand c'est une nasale qui précède \mathcal{A} , l'occlusion de la cavité buccale, et par conséquent la nasale cessant nécessairement au moment où le son \mathcal{A} commence".¹⁰ One might conclude from this that de Saussure had in mind non-buccal phonemes for the laryngeals, since the prolonged

⁷ Cf., e.g., his "Laryngeals and the Indo-European desiderative", *Language* 29.454-456 (1953), 455.

⁸ *Recueil des publications scientifiques* (Heidelberg, 1922), p. 247.

⁹ *Op. cit.*, p. 170.

¹⁰ *Op. cit.*, p. 234.

articulation of *r* would rule out any simultaneous oral articulation, but one can only speculate from these meagre suggestions.

Although Kuryłowicz has maintained and practiced the algebraic approach to IE structure throughout the span of his writings, he was less relentless in his refusal to consider the laryngeals as anything but phonologically disembodied units in 1935 than he has been since. Kuryłowicz pointed at that time to three assimilatory sound changes caused by the laryngeals: (1) following the suggestion of de Saussure,¹¹ the coincidence in Indo-Iranian of the IE voiced aspirates with older sequences of **p*, **t*, **k* and $\bar{H}_{2(4)}$ giving rise to the contrasting sets of voiced and voiceless aspirates — e.g., Skt. *sthā*-, Gk. *στᾱ*-, Lat. *stāre*; Skt. *pr̥thú-h*, Gk. *πλατύς* < IE **pr̥t̥H-ú-s*; Skt. *pánthā*, Av. *pantā*, Lat. *pōns*, < IE **pént-eH-/pr̥t̥H-*;¹² (2) the falling together of IE **b*, **d*, **ĝ*, **g* and \bar{H} with inherited **bh*, **dh*, **ĝh*, **gh* in Indo-Iranian, but **b*, **d*, **ĝ*, **g* in the other IE languages — e.g. Skt. *duhitā*, Gk. *θυγάτηρ*; Skt. *ahám*, Gk. *ἐγώ*; Skt. *máhi*, Gk. *μέγας*, Goth. *mikils*; and (3) the evidence for voicing from \bar{H}_3 , based on the single form **peH̄₃*- ‘to drink’, Skt. *píbati* < **pí-pH̄-e-ti*, Lat. *bibit*, OIr. *ibid.*, Faliscan *pipafo*, where the \bar{H}_3 adjacent to *-p-* in the thematic formation is said to have been voiced to account for the shift of **p* to *b*.¹³ The first two suggestions have become established corollaries to the laryngeal theory although examples for (2) are extremely limited; the third has by now invoked an appeal to Occam’s razor, for unless it can be explained why only the IE root **peH̄₃*- suffered such regressive voicing and no other, this isolated example can hardly be taken as evidence for the “caractère phonologique” of \bar{H}_3 .¹⁴ Kuryłowicz only once suggested the phono-

¹¹ *Op. cit.*, p. 603.

¹² Such nouns as Skt. *pánthā*, i.e. with laryngeal suffixes, have already been correctly analyzed by H. Pedersen, *La cinquième déclinaison latine* (= Det Kongelige Danske Videnskabernes Selskab Hist.-fil. Medd. 11.5), (Copenhagen, 1926), pp. 53-54; and also E. Hamp, “Indo-European nouns with laryngeal suffix”, *Word* 9.135-141 (1953).

¹³ J. Kuryłowicz, *Études indoeuropéennes I* (Cracow, 1935), pp. 46-55; but see also “Les effects du \bar{a} en indoiranien”, *Prace filologiczne* 11.201-243 (1927), 202-206, 220-221.

¹⁴ Concerning the status of *píbati*, cf. most recently and critically, G. Messing, “Selected studies in Indo-European phonology”, *Harvard studies in classical philology* 56-57.161-232 (Cambridge, Mass., 1947), esp. 185-186. For those who prefer to start with an IE **pí-be-ti*, Faliscan *pipafo* is not a writing for **bibafo* as Messing claims, but more likely shows regressive assimilation as opposed to Latin *bibit*. The tendency to avoid dissimilar sequences of stop consonants in Italic has been remarked by W. M. Lindsay, *The Latin language* (Oxford, 1894), p. 315. Couvreur’s objection that Kuryłowicz’s \bar{a}_3 , described as the voiced counterpart of $\bar{a}_{2(4)}$ (Couvreur does distinguish between two *a*-colored laryngeals, so that the following argument requires no distinction between Kuryłowicz’s \bar{a}_2 and \bar{a}_4 , hence the symbol $\bar{a}_{2(4)}$ which should be understood to mean that laryngeal which aspirates a preceding voiceless stop in Indo-Iranian), should have given **pibhati* rather than *píbati* (see *De hettitische H* (Louvain, 1937), p. 300), which Messing accepts (*op. cit.*, p. 196) is not tenable, and for two reasons: (1) Kuryłowicz nowhere states as Couvreur holds, that \bar{a}_3 is the voiced counterpart to $\bar{a}_{2(4)}$, which of course, would imply, especially for Couvreur, who interprets the Hittite *h̄h/h* orthography to be distinctive at least medially in terms of voiceless/voiced, that $\bar{a}_{2(4)}$ subsumed all the features common to \bar{a}_3 save that of voicing. Kuryłowicz merely states in terms of co-occurrent phonological components that \bar{a}_3 is voiced, $\bar{a}_{2(4)}$ non-voiced, (*Études*, pp. 55, 254), but does not specify the feature of aspiration/non-aspiration for \bar{a}_3 (hence my O in the matrix column). (2) If in fact, $\bar{a}_{2(4)}$ were aspirated as well as voiced, then \bar{a}_3 would be marked with respect to voicing (not aspiration), $\bar{a}_{2(4)}$ marked with respect to aspiration (not unvoicing), so that one would not expect \bar{a}_3 to aspirate as well as voice.

logical components of the laryngeals, extrapolated from these assimilative sound changes (including vowel-coloring effects) isolated from the various IE languages:¹⁵

	1	2	3	4
voiced vs. unvoiced	0	—	+	(0)
aspirated vs. non-aspirated	0	—	(0)	+
<i>a</i> -coloring vs. non- <i>a</i> -coloring	—	+	—	+
<i>o</i> -coloring vs. non- <i>o</i> -coloring	—	—	+	—

The marked features are clear from the evidence Kuryłowicz presents, and further necessitate an opposing feature as '*phonologique*', not merely '*phonétique*'. But the assignment of the feature voiced to ϑ_2 rather than to ϑ_1 (where 0 indicates the neutralization of the contrast voiced vs. non-voiced) is arbitrary (and similarly for the aspirate vs. non-aspirate category), and the distinction between 0 and — (apart from the vowel-coloring effects) as DISTINCTIVE features underlying the laryngeals is meaningless.¹⁶

Kuryłowicz has since resisted any further appeal to the possible distinctive features of the laryngeals and in fact has maintained that "les spéculations phonétiques ont certainement vicié une théorie qui s'en tenait par ailleurs aux traits fonctionnels des éléments ϑ ", and further, that "C'est ce qu'on peut reprocher aussi aux essais récents d'attribuer aux éléments ϑ les traits phonétiques de véritables laryngales".¹⁷

2.32. It is difficult to determine in the history of laryngeal studies whether or not the great phonological favor attached to the vowel-coloring effects of the laryngeals arose unconsciously as the direct result of taking such labels as *e*-colored, *a*-colored, or such transcriptions as *A*, *Q*, more seriously than the nature of such labels warranted. During the first decades after de Saussure's *Mémoire*, the accepted dogma concerning the nature of sound change was that of the Neo-Grammarians — a dogma which stressed the blind and arbitrary inevitability of sound change to the exclusion of all else. The inauguration of instrumental phonetic studies during this period by Rousselot and others provided, just as the equally important work of the German phonetician Eduard Sievers before him, the standard phonetic doctrine accepted by historical linguists of this period. These doctrines, and especially the work of Rousselot,

¹⁵ *Op. cit.*, pp. 55, 254. I insert Kuryłowicz's componential analysis into a distinctive feature matrix so as to be able to discuss it systematically. (0) in the matrix column for ϑ_3 indicates that Kuryłowicz nowhere decides between 0 and — for the aspiration of ϑ_3 , and similarly for the voicing of ϑ_4 .

¹⁶ I.e., one can hardly argue the '*caractère phonologique*' of both 0 (i.e., the neutralization of some otherwise distinctive opposition) and —, nor for any structural distinction between different 0's in the matrix columns for different phonemes. The number of arbitrary decisions involved in this distinctive feature scheme are due to the small number of marked features which Kuryłowicz is assuming remained as reflexes in the IE languages in relation to the four laryngeal phonemes he postulates. When ϑ_2 and ϑ_4 are collapsed, ϑ_2 becomes — voiced, + aspirated, ϑ_3 + voiced, — aspirated. The aspiration of ϑ_3 and the voicing of ϑ_2 are, of course, not directly inferable, and the decision involves more knowledge of what the three laryngeals are really like phonologically. All this simply amounts to saying is that, given the distinctive feature characteristics of the laryngeals, ϑ_3 should have the power to voice, ϑ_2 the power to aspirate.

¹⁷ Kuryłowicz, *L'apophonie en indo-européen* (Wrocław, 1957), p. 169.

emphasized from a purely synchronic phonetic point of view the inevitable influence that speech sounds exert on each other physiologically and the complex interactions of speech sounds during the speech continuum. This mutual support — that the synchronic influence of sounds on each other in the speech context might result in diachronic phonemic change — favored the early assumptions concerning vowel-coloring effects of the laryngeals. These interpretations can be summed up thus: (1) a non-teleological view of sound change, which resulted in (2) that whatever vowel-color effects the vocoid articulations were found to have, were ascribed by necessity to the neighboring laryngeals, and finally, (3) the conclusion that the laryngeal consonants must have had primary oral articulation. The last assumption is clearly the most fundamental since the shifting of distinctive features from contoid to vocoid articulation could only have occurred if the successive motor movements of both vocoid and contoid sequences directly influenced each other within the oral cavity. All of the early attempts at treating the laryngeals in terms of any kind of phonetic reality and even those more functionally oriented theories of Sapir and Martinet, are based on these assumptions of assimilative influence. We will examine these theories in turn and attempt to bring some clear phonetic explanations to them.

2.321. To Henry Sweet must go the distinction of first presenting phonetic equivalents for the laryngeals postulated by de Saussure and Möller, except those of Möller himself, which we discuss together with the systematic changes which he introduced over the period of several decades in his phonological interpretation of the laryngeals. Since it will be by no means an easy task to understand the exact phonological nature of Sweet's laryngeal consonants, the phonological description which he provides must be quoted entirely: "... and I would suggest as possible, though, of course, purely hypothetical identifications, (A) = the glottal or voiced glottal trill, (0) the same labialized, = the Danish *r* while (E) — assuming its actual existence — may have been (A) palatalized".¹⁸ Since Sweet assumed *æ* as the primary IE vowel, the *a*-colored laryngeal is here the unmarked opposition to the (marked) labialized *H*₃ and (marked) palatalized *E*. These inferred contrastive features of **e*:*o*, i.e. + palatalized (= *E*), + labialized (= *Q*) are simply transferred from the vocoid to the contoid articulations as a matter of convenient notation. Sweet has proposed that the primary autonomous feature is the voiced glottal trill (= *A*) with the secondary features of labialization and palatalization superimposed. But the exact phonetic nature of a voiced glottal trill and the possibility of such a sound to function autonomously with superimposed secondary articulations are not clear. From the meagre description provided by Sweet, three alternatives suggest themselves: (1) The voiced glottal trill can generally now be understood to correspond to the voice quality of trillization which clearly has no autonomous phonetic function, but can substitute for normal voicing, e.g., when superimposed over vocoid and contoid articulations.

¹⁸ H. Sweet, "Recent investigations of the Indogermanic vowel system", *Transactions of the Philological Society* (1880-1881), p. 169.

Although the exact motor description of this phenomenon of trillization is still not available, it is distinct and totally independent from normal voicing, as well as the voice quality of laryngealization. As a rule the older phoneticians make no mention of this particular voice quality of trillization. Pike describes trillization as a glottal trill — i.e., some kind of glottal vibration — in which the posterior section of the glottis is closed, so that trillization is produced with a decrease of air column tension.¹⁹ Now Sweet's voiced glottal trill is undoubtedly equivalent to the German phoneticians 'kehlkopf-*r*', and Sievers's description of this sound has enough similarities to what is now generally referred to as trillization, especially as it includes those characteristics — such as slow voice — which Pike now seriously doubts: "... man zu immer tieferen Tönen herabsteigend die untere Grenze seines Stimmumfangs überschreitet, so dass die Stimmbänder nicht mehr in der gehörigen Weise tönen, sondern in einzeln vernehmbaren Stößen zittern".²⁰ (2) It might be more probable from Sweet's descriptions of (*Q*) that he has in mind rather the velar *r*-fricative *ʁ*. The frequent substitution of trillization for normal voice quality in vocoid articulation before *r* (chiefly *ʁ*), and, in fact, the very term 'kehlkopf-*r*', points to some physiological similarity between trillization and the strident velar fricative *ʁ*, a similarity which may have to do with the kind of pharyngeal constriction associated with *ʁ*, and perhaps with trillization as well. There is certainly no doubt about the phonetic autonomy of *ʁ* as opposed to trillization. That *ʁ* might be the correct phonetic identification for at least one of the laryngeals has been at least implied already, and independently of Sweet,²¹ if indeed Sweet had this sound in mind as his "voiced glottal trill". (3) The term trillization is occasionally misapplied to the voiceless laryngeal fricative *h*. The latter can function as a secondary voice quality as well as an autonomous phonological unit, and the reduction in air column tension with the closing of the intermembranous portion of the glottis bears some similarity to trillization. Within this general group of laryngeal sounds are the Arabic ʕ (ayin) and *h* as well, since the latter do not have normal vocal chord vibration, but special pharyngealized characteristics. The fact that *h* and ʕ are generally equated with *x* and *ʁ* in those languages which have the latter but not the former sounds is testimony to the physiological and acoustic similarities of these sounds. Although Sweet's voiced glottal trill is less likely to be any of the sounds described here, there is nonetheless some possibility that he may have had in mind ʕ (ayin) rather than *ʁ*. Sweet's comment, however, that Möller's early suggestion of *A* = a sonant glottal spirant, and *O* = the glottal *r* "is one (distinction)

¹⁹ See K. Pike, *Phonetics* (Ann Arbor, 1943), pp. 126-127, for his description of the voice quality of trillization.

²⁰ E. Sievers, *Grundzüge der Phonetik*, fourth edition (Leipzig, 1883), p. 111.

²¹ A. Götze and H. Pedersen have pointed out an orthographic interchange of *h* and *r* in *waḥnumanzi/warmanzi* 'burn', in the *Muršilis Sprachlähmung* (Copenhagen, 1934), pp. 28-32. There is some doubt as to the inherited IE value of this word (cf. Messing, *op. cit.*, p. 162; W. Couvreur, *op. cit.*, p. 300), and although Götze-Pedersen take the sequence *ah* to be the variant of an expected *ar*, they suggest that "*h* kann kein allzu rauher Kehllaut gewesen sein, und *r* gewiss kein Zungen-*r*, eher ein Zäpfchen-*r*" (*op. cit.*, p. 30).

that I cannot realize",²² points to a real confusion between some laryngeal fricative, probably ʕ, and ʁ. Sweet's further remark that "the deep tone of the first (i.e., *A*) would naturally change a preceding (*x*) into *a* ...",²³ although phonetically difficult of interpretation, seems to imply necessarily nothing more than the maximal opening of the oral cavity of the vocoid before or after the fundamentally sub-oral articulation. It is reasonable to assume, therefore, that Sweet in effect sets up either ʕ or ʁ, which probably is no real phonetic distinction for him,²⁴ with superimposed palatalization (to account for *e*) and labialization (to account for *o*).

2.322. Möller worked for several decades on the phonetic basis of the laryngeal consonants, and one can trace the growing importance which comparative Semitic and IE linguistics played in his system with each subsequent publication. The final scheme worked out by Möller in 1911 is completely subordinated to his Proto-Semitic laryngo-pharyngeal phonemes. We trace here the changes in Möller's laryngeal consonants whose phonetic basis seems to be, at least in part, their vowel-color effect. Möller's original suggestion concerning the laryngeals was: "Diese wurzelhaften Elementen werden als consonantische (*A* = die tönende, *E* die tönlose Kehlkopfspirans?, *O* das Kehlkopf-*r*?) aufzufassen sein".²⁵ The exact phonetic boundaries of Möller's description of the laryngeals are not clearly discussed by him here, but he was to clarify somewhat these suggestions during the same year when he first stated the possible Semitic similarities of the laryngeals: "Es waren Consonanten von der Art, wie wir sie in historischer Zeit ganz gewöhnlich mit dem vorhergehenden Vocal verbunden in einem langen Vocal sich verlieren sehen (Z.B. *h* oder gutturales *r*), wahrscheinlich gutturale von der Art der semitischen, *A* = alef, der tönlose gutturale Verschlusslaut, und *E* wahrscheinlich der entsprechende tönende gutturale Verschlusslaut. *A* könnte in den meisten Fällen auch ein gutturales *r* gewesen sein ...".²⁶ Möller has therefore changed his mind concerning *A* and *E*, substituting laryngeal closure for laryngeal friction, and assigning the voicelessness to *A* rather than *E*. His next discussion of the problem, a decade and a half later, assigns no particular values to the laryngeals, but clearly has the Semitic inventory of laryngeals as the underlying plan: "... wenn nämlich die geschwundenen Konsonanten, wie höchst wahrscheinlich,

²² *Op. cit.*, p. 169.

²³ *Ibid.*, p. 169.

²⁴ See e.g. Sweet, *Primer of phonetics* (Oxford, 1890), p. 38, where he gives both *θ* and *J* as transcriptions for the Arabic ayin (ʕ). Similarly, Noel-Armfield, in his *General phonetics*, third edition (Cambridge, 1924), p. 95, describes ʁ as the voiced counterpart of *x*, therefore ghain, but describes separately *ʕ* and *h* (p. 96). For the most accurate phonetic distinctions, those which in distinctive feature terms include *x* (= voiceless velar mellow spirant), *ɣ* (= ghain, or voiced velar mellow spirant), *χ* (= voiceless velar strident spirant), and *ʁ* (= voiced velar strident spirant), all phonetically autonomous from Arabic ayin and the remaining laryngeals, see R-M. S. Heffner, *General phonetics* (Madison, 1960), pp. 148-153.

²⁵ Möller, Review of Kluge, *Beiträge zur Geschichte der germanischen Conjugation*, *Englische Studien* 3.148-164, (1880), 150-151.

²⁶ Möller, "Exkurs: Die entstehung des *o*", *Beiträge zur Geschichte der deutschen Sprache und Literatur* 7.492-534 (1880), 492, fn. 2.

welche man sich auch denken mag (Gutterales oder Kehlkopf-*r*, *h*, der spiritus lenis, usw.), Gutterale oder Kehlkopfkonsonanten gewesen sind ...".²⁷ It is of course possible that Möller in 1880 had not yet arrived at any detailed description of the IE laryngeals, and his different treatment of *A* and *E* in the same year, not to mention the improbable "tönende gutterale verschlusslaut", shows this to be true. Nonetheless in his final publication on the laryngeal consonants, Möller clarified his original suggestion concerning the laryngeals, by equating *E* with *h*, *A* with *h* and *O* with *ʕ*, and by substituting emphatic for voiced.²⁸

2.323. Sapir did not discuss as carefully the vowel-color effects caused by the laryngeals as he did certain distinctions in Pre-Greek involving the Greek breathings, and based on presumed phonetic developments involving the laryngeals. Sapir was one of the first linguists to argue that diachronic phonological explanations are not mere statements of sound change, but are based on theoretical and systematic principles of phonemic patterning. His treatment of the Greek evidence is thus based on the following synchronic law which he found so fruitful in his studies of American Indian languages: "The methodologically interesting point is suggested by cases of this sort that if a language has two sets of phonemes, one of which, B, can be reasonably defined as identical with the other, A, except for a definite qualitative plus which linguistic experience shows to be relatively infrequent, then the set B may be suspected, certainly not assumed, to have emerged from some type of absorption in the set A of, or from modification of the set A by, a phoneme (or group of phonemes) having something of the character of this qualitative plus. Entirely new phonemic categories, such as nasalization, glottalization, aspiration, rounding, palatalization, laryngealization, emphasis, tonal distinction, may thus arise as absorption products".²⁹ The linguistic parallels from certain American Indian languages and more direct evidence from Pre-Greek which Sapir explained by this kind of argument based on internal reconstruction can be summarized in the following forms:

Nootka: *-anó-*, *a'no-* < **aʔanó-*; which is proved by Kwakiutl *-aʔano-*.

Greek: **ʔwe*, **ʔwe-*, **xwe-* > Pre-Greek *ḡe-*, e.g., **Aawelk-* > **ḡelk-* > ἔλκω, but **ʔoida* > *οἶδα* also **ʔyos* > **yos* > ὄς Skt. *yáḥ*.

Sapir thus assumes (1) reflexes of the IE laryngeals before semi-vowels in Pre-Greek, which give rise to (2) a series of (long) voiceless semi-vowels from older sequences involving the voiceless laryngeals and **w*, **y*, and finally, (3) the development of initial voiceless **w* and **y* to rough breathing of the following vowel, but loss of the voiceless semi-vowels initially. These assumptions, so brilliantly argued both em-

²⁷ Möller, Review of Bechtel, *Hauptprobleme der indo-germanischen Lautlehre seit Schleicher*, *Zeitschrift für deutsche Philologie* 25.366-394 (1893), 385.

²⁸ Möller, *Die semitisch-vorindogermanischen laryngalen Konsonanten*, Det Kongelige Danske Videnskabernes Selskabs Skrifter Hist.-fil. Afd. 7.4.1, (Copenhagen, 1917), p. 3.

²⁹ E. Sapir, "Glottalized continuants in Navaho, Nootka, and Kwakiutl", *Language* 14.248-274 (1938), 268-269.

pirically and methodologically, at least with respect to sequences of laryngeal and *w*, are difficult to reconcile with Sapir's proposed phonetic inventory of the laryngeals:³⁰

- $\partial_1 = \text{ʔ}$ glottal stop followed by *e* timbre of full-grade vowel in its primary form
- $\partial_2 = x$ voiceless velar spirant (the first *a*-colored laryngeal)
- $\partial_3 = \gamma$ voiced velar spirant (the second *e*-colored laryngeal)
- $\partial_4 = \text{ʔ}$ glottal stop followed by *a* timbre of full-grade vowel in its primary form.

From the evidence produced by Sapir concerning the initial sequences of the three (voiceless) laryngeals $\text{ʔʔ}x$ and $*w, *y$ in Pre-Greek, it should follow that all three laryngeals had friction or aspiration, or at least voicelessness as a primary distinctive feature. Describing ʔ as a glottal catch may help to account for the first laryngeal's lack of coloring power on adjoining vowels, but it contradicts the phonological law which Sapir has set up. The voiced/voiceless contrast set up for x/γ , furthermore, can hardly be taken as phonetically responsible for the *a/o* contrast of adjoining vowels.

Kerns and Schwartz, starting from the Sapir-Sturtevant system of laryngeals, proposed the following set of revisions:³¹ $\text{ʔ} =$ voiceless palatal spirant, $\gamma =$ voiced palatal spirant, $x =$ voiceless velar spirant, $\text{ʔ} =$ voiced velar spirant. Kerns and Schwartz hold to the thesis of Sturtevant that IE had two *e*-colored and no *o*-colored laryngeal, and consequently assign palatal coloring rather than velar coloring. Their description of ʔ and ʔ as spirants, and not stops, was not influenced by Sapir's Greek evidence, but by their understanding of Sapir's phrase "followed by *e*-timbre of full-grade vowel" as "containing palatal coloring".

Furthermore, in spite of Sapir's valuable insistence on a more explanatorily significant approach to sound change, and the obvious usefulness of this kind of hypothesis for the American Indian languages Sapir dealt with, there are serious difficulties which it entails once the Greek facts are made to conform to the same kind of interpretation. The phonological nature of the two sets of phonemes A and B can hardly be arrived at for reconstructed languages, or for that matter, any historically attested stage of some language, with the same degree of certainty as the phonetically transcribed facts Sapir had available for the American Indian languages. But even more serious is the possibility that isolated phonological components — i.e. the "qualitative plus" of Sapir — may just as easily be derived from any one of a number of phonemic or distinctive feature oppositions, all equally likely from the viewpoint of phonological typology or phonological evolution.

Sapir's postulated series of voiceless, long semivowels is phonological conjecture, and has consequently drawn criticism concerning the likelihood that such phonemes do occur, although, if the exact phonetic details are not stressed, a contrastive series in Pre-Greek of aspirated vs. non-aspirated initial resonants (i.e., including *r, l*) seems

³⁰ *Ibid.*, p. 269.

³¹ J. A. Kerns, B. Schwartz, "The laryngeal hypothesis and Indo-Hittite, Indo-European vocalism", *Journal of the American Oriental Society* 60.181-192 (1940).

not inconceivable.³² The only (albeit untrustworthy) attested phonetic details concerning older sequences of laryngeals and resonants are the Greek breathings, and following Sturtevant, the evidence as he presents it is not nearly so certain as he would have us believe. The Hebrew-Phoenician grapheme used to represent original rough breathing in Greek was the cheth, or the Greek letter *H*, earlier Ξ . Sturtevant, pointing to the Greek use of the Hebrew-Phoenician *hē*, Greek *E* (to indicate *ε* of whatever quantity), concluded that Greek rough breathing was originally a relatively strong spirant *x* or *ç*, since the Greeks could not have heard the Hebrew-Phoenician *hē* as a consonant at all.³³ The phonological value of Hebrew-Phoenician cheth and *hē*, traditionally described as *x* and *h*, in a sense begs the question to a large degree from later pronunciation of Hebrew. Hebrew cheth (< Proto-Semitic **h* and **ḥ*, i.e. *x*) was more likely a laryngeal emphatic spirant than a velar spirant.³⁴ The use of cheth in Greek as the rough breathing, and the non-indication of the smooth breathing until Alexandrian times, both in view of Hebrew-Phoenician orthographical

³² Both Messing (*op. cit.*, pp. 195-196, 224-225) and Hammerich (*Laryngeal before sonant*, Det Kongelige Danske Videnskabernes Selskab Hist.-fil. Medd. 31.3 [Copenhagen, 1948]), have put far too much weight on the evidence of the Greek breathings in terms of phonetic developments involving the laryngeals. Messing's insistence on "*leiser Einsatz*" (or lack of a glottal catch) as the phonetic equivalent of the Greek smooth breathing on the same page as his suggestion that the Akkadian aleph (= the glottal stop) must represent *a*₁, is incomprehensible to me. Messing at no point explains the loss of this initial IE glottal catch in Pre-Greek, and even asserts: "that the spiritus lenis could represent '*fester Einsatz*', as certain German scholars have asserted, seems to have no basis in fact." (*Ibid.*, p. 224). Hammerich offers no better evidence for the particular phonetic values of the Greek breathings, but assumes that Greek spiritus lenis was no graphic expedient, but a sound midway between spiritus asper and the purely vocalic initial. In a characteristically circular passage Hammerich argues: "When *Hu* had become *Hu*, primitive Greek after the development of *h-* (< *s-*, *t-*), had no triplicity *Hu*, *u-*, *hu-* (as with the other vowels), but only the duplicity *u-*, *hu-*. And then, evidently, there was no inducement for *u-* to accept the spiritus lenis. If *u-* would not — as the only one of all vowels — preserve the pure vocalic beginning, there was no other possibility than fusion with *hu-* into this sound, or, in other words, than accepting the spiritus asper. So it has come about that all Greek words with initial *u* have the spiritus asper. And further: when *u-* and *hu-* fused into *hu*, initial consonantal *H*, being vocalized in Primitive Greek, had no possibility of assuming the quality of *u-*; this accounts for the absence of *u* as a prothetic vowel.

"But then we must infer that the spiritus lenis was no mere graphic expedient, but a phonetic reality just as well as the spiritus asper. The spiritus lenis of Greek is a direct continuation of the Indo-European laryngeal phoneme. The fusion of *Ha-/He-/Ho-/Hi-* and *a-/e-/o-/i-* into *a-/e-/o-/i-* is in fact the fusion of laryngeal initial and purely vocalic initial in close parallelism to the development of initial *r*, where *Hr-* and *r-* fused into *Hr-* = prothetic vowel + *r*" (*Op. cit.*, p. 40).

But Hammerich's conclusion that Greek spiritus lenis and \neq were distinct is assumed only to prove the validity of his speculations concerning initial sequences of laryngeal and sonant in Greek. He cites no independent evidence that the values he ascribes to the Greek breathings have any foundation.

³³ E. Sturtevant, *The pronunciation of Greek and Latin* (Philadelphia, 1940), pp. 69-73.

³⁴ This claim will become evident in the following chapters. We mention here merely the highly significant evidence that Hebrew cheth (= Arabic *ḥ* and *ḥ*), *h*, and *ʔ*, formed part of a structural series of phonemes which, when word finally conditioned a preceding anaptyctic vowel, generally *a* (but apparently sometimes *o*) traditionally termed *patākh furtivum* by Hebrew grammarians, and phonetically associated necessarily with sub-oral, i.e., glottal articulations. Cf., e.g., Gesenius-Kautzsch, *Hebräische Grammatik* (Leipzig, 1896), pp. 38, 72; and more recently, S. Morag, *The vocalization systems of Arabic, Hebrew and Aramaic* (The Hague, Mouton, 1962), p. 21.

evidence, and the Greek evidence presented by Sapir, can be easily reconciled with any number of possible phonological contrasts subsumed by the Greek breathings: (1) *h* vs. *h̄*, (2) voiceless laryngeal spirant *h* vs. voiced laryngeal spirant, or even (3) *h* vs. *ḥ*, though less likely. Since the rough breathing was certainly the marked member of the contrast, the non-indication of smooth breathing is therefore not surprising at all. Whatever the phonetic details of the Greek breathings, they will remain, together with the evidence which Sapir discussed, isolated and secondary reflexes, which should be used in terms of their compatibility with a phonological theory of the IE laryngeals rather than as exclusively inductive evidence for determining such a theory.

2.324. André Martinet has been chiefly responsible for a greater functional consideration of the phonetic features of the laryngeals, and was one of the first to insist on the necessity and importance of carrying out componential analysis in the investigation of the laryngeal phonemes. His first partial scheme for the laryngeal phonemes was accordingly: \mathfrak{a}_2 subsumes tongue retraction but no lip rounding, \mathfrak{a}_3 subsumes both tongue retraction and lip rounding. Using the phonetic transcription $A = \mathfrak{a}_2$, and $A^w = \mathfrak{a}_3$, Martinet includes these laryngeals in the following more integrated scheme of the IE phonetic inventory:³⁵

	k^s	k	
without lip rounding		g	
	gh^z	gh	A
		k^w	
with lip rounding		g^w	
	gh^{zw}	gh^w	A^w

Martinet has set up, therefore, for IE \mathfrak{H}_2 and \mathfrak{H}_3 , two tongue-retracted articulations, the first unmarked and the second marked with regard to the feature of lip rounding. Since this feature of lip rounding, or "correlation of labialization" as Martinet would have it, is already an established one in IE, his description would seem to claim more acceptance because of its greater integration into the already reconstructed PIE phonology.

There is, however, a certain amount of phonological vagueness in the scheme which Martinet has proposed, as well as somewhat contradictory phonetic descriptions. The main difficulty with Martinet's description of the laryngeals is that he does not appear to make up his mind about characterizing A as a velar (or post-velar), and therefore a primarily oral articulation, or as something velarized (or pharyngealized, even emphatic, in the sense of the Arabic emphatics), and therefore, a secondary articulation without autonomous function. His earliest treatment of the problem

³⁵ A. Martinet, "Non-apophonic *o*-vocalism in Indo-European", *Word* 9.253-267 (1953), 264-267.

includes both possibilities. On the one hand, he states that "Si la coloration *a* d'une voyelle anciennement d'avant est due à l'action d'une consonne voisine, cette consonne a dû être caractérisée par une articulation rétractée de la langue semblable à la pharyngalisation qui donne leur qualité aux 'emphatiques' de l'arabe ...".³⁶ But the phonemic chart which I have quoted from Martinet clearly demands a primary orally articulated phoneme for *A* (with superimposed labialization for *A^w*), and he accordingly argues at the same time that "... il serait difficile de voir en **A^w* le membre d'un ordre ainsi défini, parce que L'ARTICULATION BUCCALE de **A^w* implique une rétraction de la langue, trait que nous n'avons pas de raison de supposer dans **k^w*, **g^w*, **gh^w*". Il nous faudrait donc voir dans l'arrondissement labial un trait distinctif de l'indo-européen commun se combinant avec DIVERS TYPES D'ARTICULATION ORALE et nous pourrions parler d'une corrélation de labialité".³⁷

In reference to the first alternative which Martinet discusses, neither labialization nor velarization can be considered phonologically anything else than secondary articulations superimposed by necessity on other bundles of distinctive features. Martinet clearly has in mind for velarization the Arabic emphatics, and therefore the opposition flat vs. plain, and this would seem to rule out a series of tongue-retracted (velar or post-velar) fricatives. Furthermore, he has explained that the tongue retraction causes the back articulation of both *a* and *o*, and that the plain vs. flat opposition accounts for the marked rounding of *o*. Now this is typologically unacceptable, provided one wants to talk about phonological systems, and not notational ones, since velarization and labialization are both phonetic implementations of the distinctive feature of flatness — the first is usually said to occur with vowels, the second with consonants. The acoustic result is exactly the same for lip rounding and for tongue retraction concomitant with pharyngeal constriction — a lowering of the second formant of the adjoining vowel caused by the increased length of the front oral cavity. Setting up labialization and velarization as the distinctive contrast between two otherwise identical phonetic entities seems, therefore, more terminological convenience than sound phonological description.

In a somewhat later presentation of the laryngeal theory, Martinet, in a more detailed phonetic consideration of the same problems, does not decide between the two alternatives, but provides a more detailed description of possible oral articulations: "... il y a des chances pour que la coloration des voyelles voisines ait été entraînée par une articulation spécifique non glottale, tandis que l'absence de coloration s'expliquerait bien si l'on suppose pour la laryngale une articulation glottale, celle de [h] ou celle de [ʔ] par exemple".³⁸ Martinet here seems to rule out any but oral articula-

³⁶ Martinet, "Le vocalisme *o* non-apophonique en indo-européen", *Economie des changements phonétiques* 212-234 (Berne, 1955), 217. This article, except for minor details, is the author's translation of his article in fn. 35.

³⁷ *Ibid.*, p. 230.

³⁸ Martinet, "Les 'laryngales' indo-européennes", *Proceedings of the Eighth International Congress of Linguists* 36-61, (Oslo, 1958), p. 42. Cf. also this author's "Phonologie et 'laryngales'", *Phonetica* 1.7-30 (1957), for much the same kind of argumentation.

tions for H_2 and H_3 . He continues, however, with: "On ne note pas, en effet, que [h] ou [ʔ] aient jamais pour effet d'assombrir les voyelles contigues, alors que c'est ce qu'on constate fréquemment dans le cas des pharyngales, des vélaires profondes, ou des phonèmes comportant une articulation concomitante vélaire ou pharyngale ('emphatiques' de l'arabe par exemple)".³⁹ This statement might be taken to imply that H_2 and H_3 may well have been "des pharyngales, des vélaires profondes, ou des phonèmes emphatiques": "On pourrait parfaitement envisager deux types articulatoires à langue rétractée, l'un post-vélaire, l'autre pharyngale...".⁴⁰ One can only comment in answer to this proposal that one cannot imagine a distinctive opposition between '*postvélaire*' and '*pharyngale*'. The first generally refers to the Arabic *q* and *G*, which are phonetically *k* and *g* plus concomitant flatness, the second to the feature of flatness itself. Since Martinet clearly has in mind the Arabic emphatic series of phonemes, including both the laryngeal and emphatic laryngeal phonemes, I assume from the oscillation between the two phonetic alternatives which are never clearly separated by Martinet that he is erroneously equating the primary velar phonemes with superimposed pharyngealization (or emphasis) in that language, usually described unfortunately as velar, post-velar or pharyngeal, with the secondary feature of pharyngealization (or emphasis) itself, which is concomitant in Arabic not only with oral phonemes, but with sub-oral, or laryngeal, phonemes as well. His suggestion, finally, that the laryngeal inventory might be enlarged to a five laryngeal system with full voiced/voiceless contrasts for H_2 and H_3 is merely conjecture, at least until one can directly demonstrate distinctive voicing or non-voicing from the IE languages, or until one can justify that the particular phonemic inventory assigned to the laryngeals typologically requires an assumption of voice vs. voicelessness.

2.33. Several phonological systems provided for the laryngeals seem to fit best into the category which has been called synchronic-phonological, although most of the phonological discussions do not keep strictly to synchronic as opposed to diachronic considerations. Puhvel, e.g., has attempted to provide explanations for certain irregular formations and developments in the IE verb — e.g., the relation between the fifth and ninth nasal classes, where a certain conflation between forms in **-n-ew-* and **-n-eH-* can be found — by appealing to the particular distinctive feature matrix for the laryngeals which he sets up. Some of the difficulties in Puhvel's laryngeal system involving possible IE, but mostly Hittite evidence in the way of reflexes in these languages have already been discussed.⁴¹ But clearly the success of validating the possibility that such reflexes really exist depends to a large degree on the typological acceptability of the distinctive feature system which Puhvel employs, so that we discuss this aspect of his hypothesis here. The relation of Puhvel's laryngeal inventory to the

³⁹ *Ibid.*

⁴⁰ *Ibid.*

⁴¹ See §1.6.

traditional \bar{H}_1 , \bar{H}_2 , \bar{H}_3 or the relation of his system to the traditional laryngeal reflexes in IE is not pertinent here. His laryngeal system is given entirely:⁴²

E_1^y voiceless	A_1 voiced
E_1^y voiced	A_2 voiceless
E_1 voiceless	A_1^w voiced
E_2 voiced	A_1^w voiceless

Puhvel thus accepts Martinet's A vs. A^w , which Puhvel calls a contrast of velar vs. labiovelar phonemes, and sets up, as Martinet suggested, a second binary opposition of voiced vs. voiceless. His E vs. E^y are a complementary set of palatal and palatalized phonemes, each with voiced and voiceless contrasts as well. Puhvel's insistence that "... increasingly cogent assumptions of oral articulation, rather than pharyngeal or laryngeal, are likely to boost the need for quotation marks around the term 'laryngeal' itself",⁴³ leaves no doubt that he is not concerned with any secondary phonetic features such as labialization, pharyngealization and the like, but only primary oral phonemes.

The notation that Puhvel employs for his laryngeal inventory is obviously chosen to represent only the contrastive or distinctive components that he has chosen, but since to discuss Puhvel's inventory presupposes that one is dealing with some sort of typologically possible phonological system, let us first restate Puhvel's laryngeal inventory in terms of a distinctive feature matrix:

	E_1^y	E_2^y	E_1	E_2	A_1	A_2	A_1^w	A_2^w
voiced/voiceless	—	+	—	+	—	+	—	+
flat/plain	—	—	—	—	—	—	+	+
sharp/plain	+	+	—	—	—	—	—	—

It becomes obvious that the flat/plain and sharp/plain oppositions alone cannot distinguish between both E/A and E^y/A^w simultaneously. The reason is that in the distinctive feature system which Puhvel has set up, the SAME acoustic cues must simultaneously set apart E^y and E as well as E and A , e.g., so that, in general terms, if a palatalized/non-palatalized (Puhvel's palatalized vs. palatal opposition) is assumed by, say, E^y/E , it cannot at the same time be assumed by E/A as well. To put the argument somewhat differently, this phonetic system of laryngeals, as far as the symbols chosen to represent them make clear, presupposes a third underlying opposition, namely velar vs. palatal (or compact grave vs. compact acute), thus:

	E^y	E	A^w	A
flat/plain	—	—	+	—
sharp/plain	+	—	—	—
velar/palatal	—	—	+	+

⁴² J. Puhvel, *Laryngeals and the Indo-European verb* (Berkeley, 1960), p. 156. See also his "Hittite evidence for Indo-European laryngeals", *Evidence for laryngeals* 163-172, Werner Winter, editor (University of Texas, 1960), pp. 170-172.

⁴³ *Ibid.*, p. 156.

Now it is not likely that this tripartite system of binary oppositions can occur as part of a phonological system, since, if the flat/plain and sharp/plain oppositions both are distinctive, then the palatal/velar opposition (or a contrast of compact grave vs. compact acute) is only a phonetic implementation of, or acoustically identical with, either the flat/plain or the sharp/plain oppositions. Now it is quite conceivable for any two of the tonality features listed in the above matrix to realize all four phonetic possibilities, thus:

	A ^w	A	E ^w	E
flat/plain	+	—	+	—
sharp/plain	—	—	+	+

In fact we have in Jakobson-Fant-Halle the following statement: "In single languages such as Dungan Chinese and Kashmiri, the two co-existing oppositions realize all four possible combinations: (1) rounded unpalatalized, (2) unrounded unpalatalized, (3) rounded palatalized, (4) unrounded palatalized (cf. the vowel series /u/ — /i/ — /y/ — /i/)." ⁴⁴ But it is important to note that in such cases where both tonality features realize all four possible distinctions, the third distinction involved (palatal vs. velar) probably does not co-occur in the same system. In this respect it is misleading to choose flat vs. plain and sharp vs. plain as the two co-occurrent tonality features, since terminologically they generally refer to superimposed (i.e., secondary) distinctive features. One should rather describe the same oppositions in terms of palatal vs. velar with concomitant flatness or sharpness.

In general terms, then, given a fundamental palatal vs. velar contrast, it is possible to superimpose over these phonemes a secondary opposition of flat vs. plain (velarization) or sharp vs. plain (palatalization) but not both in the same system. It is questionable if one can postulate such a scheme as Puhvel's, since it establishes a secondary opposition (E^v vs. A^w) with exactly the same contrastive configuration as the primary opposition (E vs. A) — a maximal distance of energy placement within the compact area of the spectrum — hence grave vs. acute. Neither $A^w/A/E^w/E$, or $A^v/A/E^v/E$, both typologically possible, could cause the kind of glide or vocalic reflexes that Puhvel postulates, and to accept Puhvel's laryngeal inventory solely for this purpose is to my mind to throw all phonological good sense aside.

⁴⁴ R. Jakobson, G. M. Fant, M. Halle, *Preliminaries to speech analysis* (M.I.T., 1952), p. 35.

SEMITIC PARALLELS TO THE INDO-EUROPEAN LARYNGEALS

3.0. The major impetus in comparative Indo-European-Hamito-Semitic linguistics following the generally disfavored investigations of G. A. Ascoli and R. von Raumer was certainly de Saussure's *Mémoire*, and the postulating of three *coefficients sonantiques*, PIE phonemes which were soon identified with the PS *h*, *ʕ* and *ʔ* laryngeal phonemes, and thereby filling in one of the more embarrassing phonological gaps which had persisted until that time between the phonological systems of IE and PS.¹ As Cuny has remarked, the growing knowledge of Old Egyptian and of Assyriology on the one hand, and the subsequent discovery of Hittite and Tocharian on the other, all favored a more rigorous and hopefully profitable comparative study of IE and Semitic linguistics.²

The works of Möller and Cuny, however, have for the most part not provided the kind of independent comparative analysis of IE and Semitic dialects from which common general features might be extrapolated. Instead of an investigation of both the synchronic and diachronic phonological characteristics of the Semitic laryngeals, including the gradient feature of emphasis,³ as well as an attempt to discover the underlying phonological features of the IE laryngeal phonemes, the one independently from the other, we find only a Procrustean bed of etymological conjecture and the constant assumption that the cognate identity between Semitic and IE is an established fact.

Möller and Cuny certainly were not as interested in the morphophonemic relations

¹ See F. Delitzsch, *Studien über indogermanisch-semitische Wurzelverwandschaft* (Leipzig, 1873), and L. Heilmann, *Camito-Semitico e Indoeuropeo: teorie e orientamenti* (Univ. degli studi di Bologna, studie ricerche II, 1949), for general historical treatments of comparative IE and Semitic studies; and A. Cuny, "Chamito-sémitique et indo-européen, histoire des recherches", *Mélanges J. von Ginneken*, 141-147 (Paris, 1937), for an historical survey beginning with Möller's initial publications in the field.

² Cuny, *op. cit.*, pp. 141-142.

³ The description of Arabic emphasis as a "gradient feature" is that of R. S. Harrell, *The phonology of Colloquial Egyptian Arabic* (New York, 1957), chapter VIII. The term as employed by Harrell is used to indicate the fact that the phonetic evidence of emphasis covers a wide range of gradations, and that the possibility of such gradations is both stylistically and culturally employed by different dialects and speakers of Arabic.

which obtained among the Semitic laryngeal, pharyngeal and emphatic phonemes and the possible similarities which the IE laryngeals might be shown to have with these, as they were in establishing proof for the possible genetic relation between IE and Semitic. As a result of these inquiries, hypothetical cognates which they set up for IE and Semitic determined the particular IE laryngeal involved, and by inference the distinctive features of the Semitic laryngeal were simply attributed to the supposed IE cognate. It will be our task first to examine the Semitic evidence used in dealing with the IE laryngeal phonemes, and to judge the significance that the use of Semitic parallels has had in determining the phonological nature of the IE laryngeals.

3.1. Most of the work on Semitic-IE laryngeal phonemes at the beginning of this century was based on the Proto-Semitic system of laryngeal phonemes which Möller, and in an expanded form, Cuny, postulated as the frame of reference within which to consider the IE laryngeals. The untrustworthy assertions about Semitic phonology in the works of Möller and Cuny and the great advances in such crucial linguistic areas as Egyptology, for example, will necessitate a careful look at their claims concerning the Semitic parallels which they adduce.

3.11. There is little question that PS possessed a series of four laryngeal phonemes, the system more or less faithfully preserved in most modern Arabic dialects even today. The following is a partial matrix of distinctive features of the Arabic laryngeals, transcribed with the traditional Semitic symbols, which Jakobson has found advantageous in dealing with dialects of Modern Arabic,⁴ and which can be understood to subsume those features which most Semitists have been led to understand for PS as well.⁵

	ʔ	ʕ	h	ħ
flat/plain	—	+	—	+
tense/lax	—	—	+	+

ʔ vs. *h* are phonetically opposed as spiritus lenis vs. spiritus asper. It is, however, the phonetic implementation of the Arabic aleph ʔ which has led Semitic phoneticians and comparativists most astray. Unlike the ʕ, *h* *ħ* phonemes, the aleph is implemented with a greater degree of phonetic variation depending frequently on distributional properties. As Jakobson has remarked in reference to Arabic: "Of the two non-pharyngealized laryngeal phonemes *h* is opposed to ʔ as spiritus asper vs. spiritus lenis, which is implemented either as a glottal catch (e.g., in the dialect described by El-Hajje) or as ≠ — absence of a non-syllabic (cf. Cantineau, 1951), or finally as a glottal catch in free variation with zero (Blanc)".⁶ The explanation for the glottal catch or absence of a non-syllabic as the underlying phonetic implementation of ʔ

⁴ R. Jakobson, "Mufaxxama — the 'emphatic' phonemes in Arabic", *Studies presented to Joshua Whatmough on his sixtieth birthday* 105-115 (The Hague, 1957).

⁵ Cf. C. Brockelmann, *Grundriss der vergleichenden Grammatik der semitischen Sprachen I* (Berlin, 1908), pp. 42-43; J. Cantineau, *Cours de phonétique arabe* (Paris, 1960), pp. 15-25, 73-85.

⁶ *Op. cit.*, p. 112.

is clear enough. The lenis feature of the aleph is most usually reinforced by the concomitant feature of voicing, and most of the energy of the oncoming air stream is therefore used up in causing the vibrations of the glottis, so that little energy is available to produce the friction noise at the intermembranous portions of the glottis. For this reason the optimal lenis feature of the doubly unmarked aleph is implemented by the maximally reduced zero or glottal catch (i.e., maximally reduced with regard to energy or friction noise). But since the intermembranous portions of the glottis, which produce the glottal friction, and the intercartilaginous portions, which produce the glottal vibration or voicing, can function independently, a third possible implementation of the aleph could conceivably be true spiritus lenis, or weak glottal friction, attenuated by accompanying voicing. This multiplicity of phonetic implementations of the aleph will need to be kept in mind in investigating the phonetic system of the IE laryngeals based on the Semitic phonetic parallels.

3.2. H. Möller inaugurated the comparative study of the Semitic-IE laryngeal phonemes in 1907, when he no longer considered the IE laryngeals as autonomously defined phonological units, but rather as the result of the coalescence of a larger PS-IE laryngeal inventory.⁷ The following schema includes the Semitic-IE correspondences which Möller claimed to have set up on cognate (i.e., etymological) evidence.⁸

<i>Phon. Trans.</i>	<i>Phon. Value</i>	<i>IE</i>	<i>Semitic</i>
A_2	vl. non-emphatic laryngeal stop	H_1	ʾ of Old Egyptian = Semitic ʾ (alef)
ʾ	vl. emphatic laryngeal stop	H_2	ʾ of Old Egyptian = Semitic ʾ (alef)
h	vl. non-emphatic laryngeal spirant	H_1	h "pansémitique" = Arabic h
Ḥ	vl. emphatic laryngeal spirant	H_2	ḥ of Arabic
y	vl. emphatic laryngeal spirant	H_3	Semitic ʿ

We must then understand that IE $H_1 <$ the coalescence of PS ʾ and h , $H_2 <$ the coalescence of PS ʾ and ḥ , and IE $H_3 <$ PS ʿ . The chronology of sound change that Möller establishes is, more exactly, that both PS A and Ḥ coalesce to change IE \bar{e} to \bar{a} , PS A_2 and h coalesce but without changing the color of the adjoining vowel sound, and PS ʿ changes IE \bar{e} to \bar{o} ; and that further, IE H_1 , H_2 and H_3 became spiritus

⁷ H. Möller, *Semitisch und Indogermanisch, Erster Teil, Konsonanten* (Copenhagen, 1907).

⁸ *Op. cit.*, chapter IV; see also the same author's *Vergleichendes indogermanisch-semitisches Wörterbuch* (Göttingen, 1911), esp. pp. XVIII-XXI, and his *Die semitisch-vorindogermanischen laryngalen Konsonanten* (Det Kongelige Danske Videnskabernes Selskab Skrifter Hist.-fil. Afd. 7.4.1, Copenhagen, 1917). Möller's position on the original PS-PIE laryngeal inventory and its reflexes in IE did not change, although he chose varying phonetic transcription with each publication: (1907) A_2 , A , Ḥ , Y = (1911) A' , A , Ḥ , Y = (1917) A , A , Ḥ , Y .

lenis, i.e., disappeared, except in those cases where \bar{H}_1 corresponds to Semitic h , which becomes i intervocalically, but \bar{P} otherwise in IE.⁹ But since, as Möller claims, “Die gutturale A_1, A_2, \bar{H}, Y sind im Indogermanischen ebenso wie in Assyrischen geschwunden haben aber, wie z.T. im Assyrischen in der Färbung des nebenstehenden Vokals ihre Spur hinterlassen ...”,¹⁰ we can still assume that, according to Möller, IE possessed three autonomous laryngeal phonemes, $\bar{H}_1 = \bar{P}/i$, $\bar{H}_2 = h$, $\bar{H}_3 = \bar{q}$, although the vowel-coloring of the laryngeals in Assyro-Babylonian and IE has the opposite effects.¹¹

3.3. Cuny, in 1946, presented the largest laryngeal inventory of ‘Nostratic’ laryngeals of any Semitist, within which he collected his latest description of the IE laryngeal phonemes and their Semitic equivalents. The differences between Möller and Cuny are significant enough to warrant the inclusion of the latter’s full laryngeal system.¹²

<i>Nostratique</i>	<i>Arabic</i>	<i>Akkadian</i>	<i>IE</i>
Occl. forte non-emph. (ʕ)			ə ₁ (hittite: zéro)
Occl. douce non-emph.	manque dès l’origine		[serait ə ₁ , en i. eur]
spir. forte non-emph. (ḥ)	h/ḥ	ʔ/ḥ	ə ₅ (hittite: ḥ)
spir. douce non-emph. (h)	h		ə ₁ (hittite: zero)
Occl. forte emph. (ʕ̣)			ə ₄ (hittite: ḥḥ)
Occl. douce emph.	manque dès l’origine		
spir. forte emph. (ḥ̣)	ḥ̣		ə ₂ (hittite: ḥḥ)
spir. douce emph. (ʕ̣)			ə ₃ (hittite: ḥ)

Cuny has, therefore, expanded Möller’s original laryngeal inventory to include all possible distinctions involving lenis vs. fortis, spirant vs. stop and emphatic vs. non-emphatic, distinctions which Möller had assumed only for supra-glottal points of articulation,¹³ and which Cuny justifies mainly from Old Egyptian evidence.¹⁴ He has included as well the orthographic correspondences in Hittite for these laryngeal phonemes, in which he accepts Couvreur’s interpretation of the Hittite h/\bar{h} distinction, and rejects Kuryłowicz’s equation $\bar{a}_4 = \text{Hittite } \emptyset$, which Kuryłowicz assumed could alone aspirate a preceding stop in Indo-Iranian.¹⁵

⁹ Möller, *op. cit.* (1907), pp. 345-346. Möller, *op. cit.*, (1917), however, includes no examples of intervocalic $*h > i$ in IE, although he still refers to this reflex of PS $*h$, p. 5.

¹⁰ *Op. cit.* (1907), p. 255.

¹¹ See §3.4 for a consideration of this question.

¹² Cuny, *Invitation à l’étude comparative des langues indo-européennes et des langues chamito-sémitiques* (Bordeaux, 1946), p. 134.

¹³ The lenis, non-emphatic stop; lenis, emphatic stop; and lenis non-emphatic spirant are conspicuously absent in Möller’s *Lauttabelle* of the Pre-Semitic-IE laryngeal phonemes (*op. cit.*, 1911, pp. XVIII-XXI). Cuny (*op. cit.*, 1946, pp. 53-63) discusses the general character of ‘Nostratic’ consonantism which he inherits from Möller and which he endeavors to establish for the laryngeal phonemes as well.

¹⁴ See Cuny, “Évolution préhistorique de l’indoeuropéen II”, *Le Muséon* 51.151-170 (1938), pp. 159ff.

¹⁵ See J. Kuryłowicz, “ə indo-européen et ḥ hittite”, *Symbolae Rozwadowski*, 95-104 (1927).

3.31. Möller was the first to introduce the distinction of an emphatic (or velarized) and non-emphatic (non-velarized) glottal stop for PS (and Pre-Semitic-IE as well) which had not figured in PS phonology and which Cuny later accepted, both pointing to Old Egyptian as evidence for this claim. The PS distinction, which they transcribe as *ʕ* vs. *ḥ* with most Egyptologists, is never justified, nor is the difficulty, one of the thorniest of Old Egyptian phonology, even hinted at. A brief examination of this question will show that there is some doubt about the necessity for postulating a *ʕ* vs. *ḥ* distinction for PS, or even for the earliest texts of the Old Kingdom.

It has been recognized almost since the initial efforts of Champollion in the decipherment of the Egyptian hieroglyphs that the Egyptian signs in question (G1) and (M17) were to be given the values *ʕ* (i.e., a glottal catch), and *ʕ* and *ḥ* respectively, hence the transcription by Egyptologists *ḥ* for (M17).¹⁶ Recent works in Egyptology, or in the history of writing systems, give *ḥ* as the sole value for (M17),¹⁷ or both *ʕ* and *ḥ*, but predominantly *ḥ*, with *ʕ* limited in certain words to initial position only.¹⁸

The problem in the phonological interpretation of Old Egyptian *ʕ* and *ḥ* is two-fold: the distinguishing of internal Egyptian evidence for the change of (M17) = *ḥ* to *ʕ* in certain environments, and those etymologies of any certainty, in which Old Egyptian (M17) corresponds to Hebrew *ח* (or PS *ʕ* in general) — the primary evidence for attributing the value of at least one kind of glottal stop or vowel attack to *ḥ* for the earliest period of Egyptian. Möller's statement in discussing his equation PS *h* > *ḥ* intervocalically in IE: "Vgl. das ägyptische *ḥ* aus urspr. *A*₁ (i.e., *ḥ*) und der Übergang des *ʕ* (Aleph) zwischen Vokalen in den Laut *ḥ* im Syrischen",¹⁹ seems to have no basis in fact.²⁰ Sethe established with apparent certainty already in 1899 the change of Old Egyptian (M17) = *ḥ* to *ʕ* in Coptic and perhaps as early as the Middle Kingdom, summarized in the following rules: "(1) (dass) jedes altes (M17) = *j* im Kopt. als erhalten ist, wenn so in der Tonsilbe stand und Seinen Wert *j* nicht mit dem Wert *ח* vertauscht hatte; (2) (dass) demgemäss jedes (M17), das im Kopt. weggefallen ist, obgleich es in der Tonsilbe stand, ein (M17) gewesen sein muss, als es wegfiel".²¹ Erman, in 1928, arrives at similar conclusions: "Doch hat das (M17) in

¹⁶ Cf. G. Steindorff, "Das altägyptische Alphabet und seine Umschreibung", *Zeitschrift der deutschen morgenländischen Gesellschaft* 46.709-730 (1892), esp. pp. 225-226, for an elaboration of the phonological system underlying the Old Egyptian writing, although Steindorff was one of the first to contest an original *ʕ* value for (M17) in addition to *ḥ*, later discussed in K. Sethe's important *Das ägyptische Verbum I, Laut- und Stammeslehre* (Leipzig, 1899), pp. 66ff. I have substituted sign references in A. Gardiner, *Egyptian Grammar*, 3rd edition, revised (London, 1957), pp. 438-548, for the Egyptian hieroglyphic characters in this chapter, and have omitted them from quotations when they are unnecessary.

¹⁷ E.g. I. J. Gelb, *A study of writing* (Chicago, 1952), pp. 72-81, where the phonetic values for the Egyptian uniconsonantal syllabary are taken from C. Fossey, *Notices sur les caractères étrangers* (Paris, 1927), p. 4.

¹⁸ See A. Gardiner, *op. cit.*, p. 27.

¹⁹ *Op. cit.* (1907), p. 346.

²⁰ The change, however, of Old Egyptian *ʕ* to *ḥ* is well attested. So E. Edel, *Altägyptische Grammatik I* (Rome, 1955), pp. 59-60; W. Czermak, *Die Laute der ägyptischen Sprache I: Die Laute des Alt- und Mittelägyptischen* (Vienna, 1931), pp. 110-112; Sethe, *op. cit.*, pp. 49-50.

²¹ Sethe, *op. cit.*, p. 66. The etymological evidence is presented pp. 62-66, and accepted by J. Vergote, *Phonétique historique de l'égyptien* (Louvain, 1945), pp. 76-77.

Anlaut der Worte *j* geworden ist, verwandelt sich im (F32), wenn das betreffende Wort noch ein (Aa1) enthält..."; and finally "Schon in m.R. war das (M17) so entwertet, dass man da, wo man ein *j* gesprochen haben wollte, austatt seiner zwei andere Zeichen wählte, das (M17 doubled) und das (G1 doubled)".²²

Both Czermak and Vergote have, most recently, indicated the possibility that, while (M17) may not even in the earliest times have the value *ʔ* (i.e., glottal stop), (M17) might well have stood for the *attaque douce* in those cases where it was not equivalent to *ḫ*.²³ The evidence which Czermak brings to bear, and which Vergote is inclined to accept, is not, as far as I can see, comparative Semitic but based on internal sound changes within the history of Egyptian. Czermak's reasoning is based on the observation that initial *ḫ* and *ʕ* never alternate in the oldest periods of Egyptian orthography. As Czermak has elaborated: "Am deutlichsten aber weist das uralte (M17) prostheticum wie in **mnúf* auf diesen hin. Dieses (M17) prostheticum hat mit *i* nichts zu tun; es ist nicht aus (M17) hervorgegangen, sondern ist der leise Einsatz eines Gleit- oder Hilfsvokals, der vor eine Doppelkonsonanz tritt, die das AAe ebensowenig duldet wie das Semitische".²⁴

All of the evidence which we have discussed concerning the sign-values of (G1) and (M17) points to well-established, although by no means settled conclusions: the primary sign value of Old Egyptian (M17) was clearly *ḫ*, which under stated conditions, i.e., in non-initial and unstressed syllables, became *ʔ* in Coptic, and perhaps even by the Egyptian of the Middle Kingdom. Neither Sethe, who still persisted that *ḫ* might have had the original value of *ʔ* as well as *ḫ*,²⁵ or Vergote, who has most recently claimed that: "Quant aux exemples où *ḫ* correspond à l'alef proto-sémitique, l'occlusion laryngale peut s'être amuie en syllabe non accentuée dans les mots *ḫnk*, *ḫnw* et sous l'influence de la voyelle *ḫ* dans *ḫw*; *ʔ* s'accomode en effet mieux avec une voyelle postérieure qu'avec une voyelle antérieure",²⁶ have entirely accounted for the persistent instances where *ḫ* = PS *ʔ* or alef;²⁷ but it becomes increasingly clear that the original sign value for (M17) must be taken as *ḫ*.

3.311. Recent investigators of Arabic dialect phonology have again raised the question of the existence of more than a single glottal stop phoneme, and have pointed to an emphatic and non-emphatic glottal stop co-occurring in certain modern Arabic dialect areas. Both Cantineau and Lehn have pointed to two distinctive glottal stop phonemes, the first for the Palmyrian dialect of Syria, the second for Cairo Egyptian.²⁸ Harrell has recently found examples of an emphatic glottal stop in

²² A. Erman, *Ägyptische Grammatik* (Berlin, 1928), pp. 41-42.

²³ Czermak, *op. cit.*, pp. 112-133; Vergote, *op. cit.*, pp. 76-79.

²⁴ *Op. cit.*, pp. 112-113.

²⁵ *Op. cit.*, §109.

²⁶ *Op. cit.*, p. 79.

²⁷ The etymological evidence for this equation is listed in Vergote, *op. cit.*, pp. 131-132.

²⁸ Cantineau, *Le dialecte arabe de Palmyre* (Beyrouth, 1934), pp. 33, 69; W. Lehn, "Emphasis in Cairo Arabic", *Language* 39.29-40 (1963).

Standard Colloquial Egyptian,²⁹ although the occurrences are limited to expressive words and interjections for the most part. But the phonemic status of an emphatic and non-emphatic stop in Arabic is not a strictly phonologically autonomous matter, but is rather the result of imposing one particular phonemicization from a large repertory of possibilities for the Arabic feature of emphasis in general. Since Arabic emphasis is a long componential feature whose minimal domain is the syllabic sequence CV, phonemic status could be imposed on the vocalic as well as consonantal inventory, and less redundantly as a syllabic prosodeme.³⁰ Instances of *Pa/Pæ* sequences would then remain isolated cases of *a/æ* not occurring in emphatic/non-emphatic syllables only, so that the traditional consonantal distinctions of emphatic/non-emphatic phonemes would require *Pa/Pæ* sequences to be phonemically *Pa/ʔa* (? = emphatic glottal stop here). Harrell makes a further, but unnecessary, attempt to justify this phonemic interpretation by pointing to possible physiological and acoustic correlates of an emphatic and non-emphatic glottal stop: "... present phonetic evidence indicates that stops are perceived by the acoustic character of their noisy release or by the distortion of the last fraction of the preceding vowel before the consonant closure is made. There is no reason why the noise of the closure or release of the glottis, with varying adjustments of the mouth and pharynx should not produce distinctively different distortions of following and preceding vowels in such a manner as to make it necessary to recognize two or more phonetic types of glottal stop, or even two or more glottal stop phonemes".³¹ The perceptual correlates of speech which Harrell points to are beyond doubt and there is no doubt that an Arabic speaker will react to sequences of *Pa/Pæ* with a difference in the vowel sound alone as a distinction involving the stop(s). But the "distortion of following and preceding vowels" which Harrell discusses are caused by inherent transfer characteristics associated with the significant resonances and anti-resonances (zeros) of stops; the glottal stop is a transient characteristic involving the relative timing of breath and vocal chord vibration at the glottis, so that the pharyngealization and other oral characteristics associated with the vowel *a* are not distortion effects of any kind of glottal stop phoneme.

3.2. Cuny, in addition to setting up a PS ʕ vs. ʕ̣ contrast, for which there is some doubt, sets up an additional contrast between a "spir. forte non-emph." (ḥ) vs. a "spir. douce non-emph." (h̤).³² Now it is the "spir. forte non-emph.", or the tense plain laryngeal spirant, that corresponds to the Semitic *h*. Furthermore, what Cuny transcribes as ḥ is really only one possible phonetic implementation of the Semitic aleph. Cuny's note to the latter phoneme is instructive on this point: "*h* sonore?

²⁹ *Op. cit.*, pp. 77-78.

³⁰ Cf. Lehn, *op. cit.*, for a consideration of the phonemicization of Arabic emphasis. None of these phonemic interpretations of Arabic emphasis is found in traditional descriptions of Arabic phonology, of course, since the latter are based entirely on orthographic facts alone.

³¹ *Op. cit.*, p. 77.

³² *Op. cit.*, pp. 133-134.

On relève aujourd'hui des *h* sonores dans plusieurs parlers arabes et berbères. En général, *h* sonore et *h* sourd se sont confondus en chamito-sémitique au profit de *h* sourd. Mais, dans certains parlers la confusion inverse se serait produite, d'où les *h* sonores qu'on constate çà et là soit en arabe, soit en berbère".³³ The voiced/voiceless variants of *h* (the lax laryngeal spirant) are non-distinctive. It is the greater degree of friction of Arabic *ḥ* and *h*, e.g., contrasting with the lesser degree of friction of Arabic *ḥ* and *h*, which is distinctive. The voiceless variety usually appears as *ḥ* (i.e., a true glottal stop), the voiced as a voiced laryngeal lax spirant. This is to say that tenseness is usually (but not necessarily) concomitant with voicing. Cuny's further claim that an additional 'Nostratic' (tense) non-emphatic laryngeal *ḥ* is represented by Old Egyptian (F32) (i.e., an animal's belly with teats, usually transcribed *h*) is questionable. There seems to be little doubt that (F32) represented a new phoneme *ḥ* which arose in Old Egyptian as a result of the palatalization of stops, which is now generally accepted. So Edel: "Aus dem ursemitischen *h* scheint sich im Zug der alten Präpalatalisierung ein Laut [ç] (gesprochen wie *ch* in *ich*) abgespalten zu haben ...".³⁴ Vergote has further explained the interchange of (F32) with *š* (N37) in the earliest texts, and with (Aa1) *ḥ* in later Egyptian, as the result of an original falling together of Old Egyptian *ḥ* and *h* before their subsequent palatalization to *ç*, a phoneme not sufficiently distinguished from *š* in the earlier texts.³⁵

3.4. In recent times Couvreur and Messing have returned to the comparative Semitic evidence with much greater sobriety in dealing with the phonetic nature of the laryngeals, by attempting to determine what kind of phonological features the IE laryngeals might subsume without pointing merely *a priori* to Semitic examples. Both writers have pointed to the compensatory lengthening of a preceding vowel by a laryngeal (*ḥ*, *ḥ*, *h*, *h*), and the subsequent loss or merger with *ḥ*, as is the rule for Akkadian in general.³⁶ Thus Akkadian **ḥaprum* becomes *eprum* in Old Babylonian, but Akkadian **baḥlum* becomes *bēlum* in Old Babylonian. Cf. also Assyrian *zepšātum* from **zapšātum*, but Babylonian *apšētum*.

The Akkadian examples of vowel changes caused by neighboring laryngeal phonemes, which Couvreur takes as prototypes of the IE change of vocalism caused by the laryngeals, and which Messing accepts, do not, however, represent absolutely analogous changes. The evidence adduced in these cases is neither exhaustive nor accurate, and for the most part represents a (typologically) rare set of changes, as well as an unusual kind of vowel coloration concerning the Semitic laryngeals, limited in this case to only East Semitic, and most regularly to Babylonian. In the

³³ *Ibid.*, p. 134.

³⁴ Edel, *op. cit.*, p. 53.

³⁵ See Vergote, *op. cit.*, pp. 64-67.

³⁶ W. Couvreur, *De hettitische Ḥ* (Louvain, 1937), pp. 270ff; G. Messing, "Selected studies in Indo-European phonology", *Harvard studies in classical philology* 56-57.161-232 (Cambridge, Mass., 1947), 222ff. My examples are from A. Ungnad, *Grammatik des Akkadischen*, third edition (Munich, 1949), and W. von Soden, *Grundriss der akkadischen Grammatik* (Rome, 1952), pp. 8-9, 22-23.

Sargonic period of Akkadian the only consistent occurrences of the vowel change *a* to *e* are in closed syllables beginning with P_{3-5} (i.e., *h*, *ʕ*, *g*).³⁷ The changes of *a* to *e* which Couvreur gives are Old Babylonian, and less consistently Assyrian. They are, however, not limited to *h* and *ʕ*, but occur regularly in Old Babylonian in the environment of *P* and probably *h* as well. Thus Gelb states: " P_1 had not influenced the change of *a* to *e* in *ra-si-im* / *raʕšim*/, *za-nam* / *ʕaʕnam*/, as opposed to OB *rêšim*, *šēnam*, P_2 evidently behaves like P_1 although because of the limited number of examples, it is impossible to argue apodictically".³⁸

The change of *i* to *e* is attested regularly alongside that of *a* to *e* in Assyrian, but not Babylonian, and under the same conditions: **iʔpus* > Babylonian *īpus*, but Assyrian *ēpuš*.³⁹ Other vowel changes presumably caused by laryngeals in Akkadian show features similar to the long component characteristics of the emphatics in Arabic. In substantives of the form $C_1aC_2C_3$, e.g., *pars*, where $C_3 = h, ʕ$ or *g*, *a* becomes *e* regularly with loss of C_3 : e.g., *qēmum* < **qamḥum*; *zērum* < **zarḥum*, *šētum* < **ṣalḥum*,⁴⁰ although the traditional explanation is to posit a metathesis of the C_2C_3 sequence to C_3C_2 so that the vowel change and compensatory lengthening can be compared to the preceding examples.

Considering the nature of the Akkadian sound changes, especially in relation to Semitic phonology as a whole, Couvreur's claim that "De aanwezigheid van een vroegere *h* of *ʕ* wordt derhalve in het Akkadisch uitsluitend door de *e*-kleur verraden, een overeenkomstige rol speelt in het Indo-Europeesch de *á*- of *ó*-kleur",⁴¹ is not accurate, since both he and Messing conclude that H_2 is to be identified with *h*, H_3 with *ʕ*. If the Akkadian sounds are significant only with respect to their possible influence on vowel color, then the identifications which Couvreur gives for the IE laryngeals hardly follow; and if the inherent coloring power of the Akkadian phonemes is emphasized, then *h* must be said to have the opposite effect on neighboring vowels in IE from what it has in Akkadian. But even though the vowel coloring effect of the laryngeals in East Semitic is different from IE (and also different from West Semitic, i.e. Arabic dialects in general, for which more later) and are, therefore, not exact parallels, the East Semitic changes can be easily reconciled with the IE evidence, if there is evidence that, in fact, one is dealing with similar laryngeal sounds in IE.⁴² The important point is that phonological rules describing both assimilation as well as dissimilation in the same sequences both presuppose the same OPPOSITION. The difference lies in the relation of values that obtains across elements undergoing assimi-

³⁷ See Gelb, *Old Akkadian writing and grammar third edition* (Chicago, 1961), pp. 123-129. My examples and summary of the Akkadian materials are taken from this source.

³⁸ *Op. cit.*, p. 119.

³⁹ See von Soden, *op. cit.*, p. 26; Gelb, *op. cit.* (1961), pp. 125-126.

⁴⁰ Von Soden, *op. cit.*, pp. 11-12.

⁴¹ *Op. cit.*, p. 289.

⁴² The following two chapters attempt to provide such evidence, so that the following remarks should be kept in mind.

tion or dissimilation.⁴³ In distinctive feature terminology, therefore, assimilation and dissimilation, whether synchronic or diachronic, are processes which require matching values and opposite values, respectively, between elements undergoing either process. Both presuppose, however, the same opposition. Thus, while it may not be known whether vowel changes are the result of assimilation or dissimilation (i.e., if the particular value of the sound causing either process cannot be identified independently in any given sequence), the value of the opposition is guaranteed in either case. Of course, in East Semitic, the particular value of the laryngeal is known independently from both comparative as well as internal facts, so that it is, in fact, correct to say that the relevant process for East Semitic is one of dissimilation.

⁴³ See M. Halle, "A descriptive convention for treating assimilation and dissimilation", *Quarterly Progress report* 66, Research Laboratory of Electronics (MIT, 1962), pp. 295-296.

THE CONSONANTAL NATURE OF THE INDO-EUROPEAN LARYNGEALS

4.0. The multiplicity of phonological systems imposed on the IE laryngeal phonemes that we have examined appears to be due on the one hand to the difficulty encountered by the comparative method in dealing with a set of only disparate and isolated effects — i.e. when there are not sufficient direct reflexes from enough IE languages, and on the other by more vague phonetic speculation than well-developed methodology or merely useful procedures for determining and justifying the phonological nature of such a set of reconstructed phonemes. The initial attempts that we have discussed were concerned chiefly with the phonetic realism of some possible set of phonemes that might be held responsible for causing the effects attributed to the laryngeals. The kinds of argument necessary to support such proposals are those in which certain sets of phonetically defined phonemes can be said not to violate general historical phonological development. Thus the works of Grammont¹ and Meillet² are filled with the discussion of historical tendencies which cannot be said, at least intuitively, to violate the kinds of historical change which sounds can undergo. In discussing the first Germanic sound shift, e.g., Grammont states that “En germanique préhistorique une tendance au retard de l’entrée en vibration de la glotte aboutit à la mutation consonantique”.³ There is, of course, nothing phonetically unacceptable about such a development, but the conclusion that such a phonemic patterning will necessarily produce this kind of historical development does not follow, and the end result of such a development can hardly be said to point necessarily to only one prior phonological system. To explain the occurrence of this particular tendency (and a tendency only after the fact), therefore, Grammont expectedly adds to the number of unknowns: “Les Germains, par suite d’influences diverses, surtout par l’effet du mélange avec les populations qui occupaient avant eux leur nouveau séjour, et après le consolidement héréditaire de nombreuses générations, se trouvèrent avoir leurs organes émetteurs de sons tenus dans telle attitude qu’il leur fut impossible de faire commencer les vibrations glottales avant l’explosion d’une douce ou immédiatement

¹ M. Grammont, *Traité de phonétique* (Paris, 1933), esp. pp. 166-179.

² A. Meillet, *Linguistique historique et linguistique générale* (Paris, 1958).

³ *Op. cit.*, p. 167.

après l'explosion d'une forte".⁴ To attempt to set up general laws of diachronic phonological development, such as Sapir was in effect attempting in his laws concerning isolatable qualitative pluses, is simply premature at this stage of one's understanding of the teleological (causal) principles of sound change.

4.01. It is, therefore, difficult, if not impossible, to argue from later reflexes of the laryngeal phonemes in the various IE languages, since none of these reflexes, either singly or taken together, point to one given set of proto-phonemes rather than some other. The Hittite orthographical consonantal reflexes of the laryngeals are notoriously difficult to determine phonetically because of the orthographic history involved, and represent probably a conflation of the original IE laryngeal system. Such structural reflexes as compensatory vowel lengthening attest only to the loss of some syllable margin phoneme, and the distinctive feature of aspiration in Indo-Iranian cannot be limited to any smaller subset of phonemes than those which possess some distinctive noise, be it aspiration, tenseness, or frication. Lehmann has added to the collection of phonological reflexes of the laryngeals an important (because synchronic, although reconstructed) feature of the laryngeals, namely their distributional possibilities in IE root structure, and the similarities which their distribution shares with other IE phonemes. Thus Lehman lists the following types of root structure, in order of frequency:⁵

CeRC e.g. /b ^h eyd/	Skt. <i>bhédati</i> 'splits'
CeRX e.g. /pewX/	Skt. <i>punáti</i> 'purifies', Inf. <i>pávítum</i>
CeXR e.g. /leXw/	Latin <i>lāvit</i> 'washed'
CeXC e.g. /peXs/	Latin <i>pāscō</i> 'pasture'
CeCX e.g. /metX/	Skt. <i>mathnáti</i> 'shakes', pptc. <i>mathitá</i> ⁶

From this evidence Lehmann concludes that except for *s* and the laryngeals, "IE root structure shows progression from most open sound at the peak of the syllable to sounds of greater closure".⁷ The fact that Lehmann can rule out all but fricative sounds for the laryngeals on this basis certainly does not provide any major clue to the laryngeal phonemes, although it is argued from purely structural grounds (i.e., synchronic, not on the basis of later reflexes).

⁴ *Op. cit.*

⁵ W. P. Lehmann, *Proto-Indo-European phonology* (University of Texas, 1952), pp. 106-107.

⁶ Lehmann appears to take the Sanskrit 9th class verb *mathnáti* as a primary nasal infix verb from a root **metH₂-*, and therefore does not consider the root as containing an original nasal, i.e., **ment-* (*op. cit.*, p. 106; cf. also "The conservatism of Germanic phonology", *Journal of English and Germanic philology* 52.140-152 [1953]). Since these 9th class verbs are hardly primary, Puhvel's explanation seems more probable: "On the same root (i.e. **ment-*) was created a laryngeal suffix noun **mént-eH-*, gen. **mēt-H-os*, the ancestor of Sanskrit *mānthāh*, gen. *mathāh*. *mathnáti* is a 9th class replacement for the original 7th class present, with infix imitation on a denominative level from the noun stem **mēt-H-*, i.e., **mēt-n-eH-* ..." (*Laryngeals and the Indo-European verb*, [Berkeley, 1960], p. 33). A better example is perhaps Puhvel's **petH₂-* 'spreads out', Greek *πετώννμι*.

⁷ *Op. cit.*, p. 107.

There is not even conclusive historical evidence that necessarily points to the contrastive features of voicing or non-voicing for the laryngeals, although Austin, Sturtevant, and Lehmann, following Sapir, have used the latter's historical assumptions concerning laryngeals and semivowels in Pre-Greek⁸ — i.e., (1) reflexes of the IE laryngeals before semivowels in Pre-Greek, which give rise to (2) a series of long voiceless semivowels from older sequences of voiceless laryngeals and **w *y*, and finally (3) the development of initial voiceless **w *y* to rough breathing of the following vowel, but loss of the voiceless semivowels initially, — to establish a contrast of voice and voicelessness for at least three of the IE laryngeals. Lehmann points out, following Sapir, that the Pre-Greek resonants after IE *h x ʔ* were the same as those after IE **s*, and claims that Sturtevant has given sufficient evidence that these reflexes, written *ῥ*-, *λ*-, *μ*-, *ν*-, were voiceless resonants.⁹ Now Sturtevant, as the sole direct proof that the Pre-Greek resonants following the reflexes of IE laryngeals were voiceless, points to the parallel development of Greek reflexes of IE **sr*-, **sl*-, **sm*-, **sn*- i.e., arguing that since these sequences developed to voiceless resonants, the primary voice quality of at least three laryngeals was voicelessness as well.¹⁰ Sturtevant cites only the inscriptional orthographic practice of rendering older sequences of **s* plus resonants as *hR*- or *Rh*-, and such spellings as *τέθριππον* from *τετρ-ίππο*-, but this does not conclusively point to voicelessness, and Sommer's conclusions that the resonants in question were aspirated, at least initially, are relevant here. Sturtevant himself, in discussing the various orthographies, explains that "... the aspiration did

⁸ W. M. Austin, "The prothetic vowel in Greek", *Language* 17.181-188 (1941), although Austin arrives at developments similar to those of Sapir on the basis of the alternation of prothesis and rough breathing in Greek. Admittedly the only examples for which independent evidence in the way of Hittite is available are Gk. *ἄνιμι* 'blow', *ἀνιῶ* 'scatter by the wind', Skt. *vāti*, Hitt. *huyant-* 'wind'; and Gk. *δωρία* 'dwelling, foyer', Hitt. *hweš-* 'to live', *hweša-* 'alive, raw' (but see now Roduíguez Adrados on this problem, *Estudios sobre las laryngales indoeuropeas* (Madrid, 1961), pp. 35-42, although the book is not to be trusted); but Messing's objection ("Selected studies in Indo-European phonology", *Harvard studies in classical philology* 56-57.161-232 (Cambridge, Mass., 1947), pp. 194-195), that "the fallacy of the entire argument is the implicit assumption that the Greek rough breathing can represent a laryngeal, which is untrue ..." (p. 195) does not hold, since Austin claims no more than did Sapir — namely, that sequences of laryngeal and semivowel in Pre-Greek become rough breathing, and perhaps even less, that older sequences of laryngeal and semivowel fall together with older sequences of *s* and resonant or semivowel in the feature of initial voice quality. Cowgill (*Evidence for laryngeals* 93-162, Werner Winter, editor [University of Texas, 1960], pp. 118-123) has brought a more serious objection to Austin's evidence, claiming that the development of **Hw-* to both **a(F)*- and **h(F)*- in forms involving the same IE root (and further positing an IE distinction of reduced grade (**H_ew*); to account for the first, but zero grade (**Hw-*) for the second) is ad hoc, since the distinction between zero and reduced grade cannot be given any synchronic distribution parallel to the other ablaut grades. Austin has suggested the possibility that "forms with 'prothesis' are associated with Homer and the dialects underlying Homer, while forms with spiritus asper are associated with Attic, though this is not always true" (p. 89). It remains to investigate the possibility of explaining the alternations on the basis of predictable phonological environment, where the different sequences of resonants may underlie the alternant developments, whether in terms of Sievers-Edgerton, or a reduced vowel theory which is not totally ad hoc.

⁹ See Lehmann, *op. cit.*, p. 107.

¹⁰ Sturtevant, *op. cit.*, pp. 60-64.

not either precede or follow the p , but accompanied it throughout".¹¹ There is, of course, no further typological possibility that one might set up for these resonants, and the argument is at least in part terminological, since the opposition tense/lax can subsume voicelessness/voice as well as aspiration/non-aspiration (and length/non-length as well). It is possible typologically that initially and medially these resonants were aspirated rather than voiceless, perhaps voiceless in other positions, so that a voiced/voiceless contrast when superimposed with resonants, had more than a single phonetic implementation. The argument at this point, therefore, becomes pointless, but one should point out that one can hardly eliminate any distinctive feature opposition other than voiced/voiceless for the IE laryngeals on such evidence in Pre-Greek, since other oppositions, if they can be established independently, will explain the Greek evidence equally well. And if the distinction in Pre-Greek could be established with certainty as voiced/voiceless, it need not follow that the same IE opposition remained intact throughout the course of development to Pre-Greek, nor does it rule out the possibility that the opposition might have been reinterpreted phonologically within the Pre-Greek phonological system.¹²

4.1. Since to argue about the phonological nature of the IE laryngeals from later disparate and inconclusive reflexes of these phonemes cannot easily lead to valid conclusions about the IE laryngeals, because of the many-to-one rather than one-to-one relation of reflex to reconstructed phoneme which exists in the present state of diachronic phonemics, more success might be achieved from examining certain accepted synchronic, although reconstructed, features of PIE. The nature of the IE laryngeal phonemes is, after all, if a meaningful consideration, a synchronic fact, and the phonological features of the laryngeals should be more readily and validly arrived at from PIE phonological characteristics, rather than from isolated sound changes in the IE dialects. The single most conclusive and delimitative phonological characteristic associated with the laryngeal phonemes, which the earliest attempts at identifying the *coefficients sonantiques* of de Saussure recognized, was their vowel-coloring effects. Now it is the case that what diachronically appears in most IE languages as a distinctive */e a o/* opposition, must have been synchronically, for

¹¹ *Op. cit.*, p. 62. Cf. also F. Sommer, *Griechische Lautstudien* (Strassburg, 1905), pp. 26-44.

¹² Lehmann has further suggested (as well as L. L. Hammerich, *Laryngeal before sonant*, Det Kongelige Danske Videnskabernes Selskab Hist.-fil. Medd. 31.3, [Copenhagen, 1948]), that voice be established as a distinctive feature for IE \tilde{H}_3 (Lehmann's γ), and that those roots with initial $*\gamma$ which develop to dz in Greek were originally preceded by a voiced laryngeal γ , so that $*\gamma V-$ became $dzV-$, but, with Sapir, that voiceless laryngeal + V became $V-$ in Greek (*op. cit.*, pp. 74-79). Lehmann, however, is on weaker ground in the matter of IE $*\gamma$ than Sapir was with initial IE $*w$: while initial $*w$ showed contrasting developments to loss of $*w$ with prothesis, and rough breathing, there is no compelling reason to insist that the roots in question, at least phonologically, could not develop dz from initial IE $*\gamma-$ rather than necessarily from $*\gamma\gamma-$, except perhaps from the obvious parallelism inherent in $*dy-$, $*gy-$, $*\gamma\gamma-$ becoming $dz-$. Cowgill has summed up the meagre evidence for independently assuming an initial laryngeal for such forms, for which see "Evidence for laryngeals in Greek", *Evidence for laryngeals* 93-162, Werner Winter, editor, (University of Texas, 1960), pp. 124-130.

some stage of PIE before the loss of the laryngeal phonemes, an allophonic distribution *[*e a o*], conditioned by the then distinctive laryngeals. What the phonological facts are concerning the vowel-color effects of the laryngeals on ablauting *o*, and chiefly with regard to \bar{H}_2 , is still a matter of dispute, although \bar{H}_1 and \bar{H}_2 can be safely said to have had no effect on ablauting *o*. It may be more profitable to take up this question again when independent evidence is available as to the likelihood of the IE laryngeals producing *a*-color or *o*-color.

It remains to be asked what synchronic phonemic pattern requires the kind of allophonic vowel distribution which existed in PIE, for reasons that can be attributed to necessarily occurring functional relationships among phoneme complexes that will insure their distinctive role in the language code. The distinctive feature of flatness or pharyngealization in the phonemic system of Modern Arabic gives general phonological evidence of this kind, and the Arabic system of emphatics and laryngeal consonants is, therefore, the closest available parallel phonemic system from which to deduce such phonological generalities of structure.

4.2. A phonological consideration of the Arabic emphatic and laryngeal phonemes is complicated by at least two factors: (1) the great dialectal differences which exist in the Modern Arabic speaking world, and (2) a lack of precise terminological and methodological apparatus, rather than a dearth of phonological detail, which is apparent in most phonological discussions of Arabic phonology, and almost from the time of Sibawaihi himself, the first important native Arabic phonetician. Apart from the great amount of impressionistic and kinaesthetic feedback which is claimed, either by native speakers of Arabic or by trained phoneticians, which hardly serves to advance the inquiries into Arabic phonology, the question which underlies the problem is the physiological, acoustic and distinctive feature description and delimitation of emphasis itself. The sounds in question are the Arabic (a) *t̤ d̤ s̤ z̤*, (b) *r l*, (c) *q ħ ġ d* (d) *ħ ʕ* phonemes: the first two groups have non-emphatic partners (although the assignment of emphasis to the consonants is orthographic), but *l* and *r* are emphatic in some dialects only in the environment of some other emphatic phoneme, i.e., some member of (a), (c) or (d), and therefore non-phonemic; the last two groups do not have, or at least are traditionally not described as having, non-emphatic partners, and the last group is only rarely described as emphatic in any case.

4.21. The most vexing problem in Arabic phonological studies has always been the delimitation and description of the term emphasis. The difficulties in the way of this undertaking are several: (1) The great diversity and range of physiological parameters which co-occur in the articulation of these sounds has made it difficult to separate those parameters which are essential from those only secondary, and which therefore do not consistently appear, even in the same dialect. Modern acoustic phonetic research has given ample evidence that there is far from isomorphism between the physiological and acoustic, and hence perceptual, stages of the total speech process,

and distinctive feature theory has shown the acoustic to be the significant one from which to erect universals. The relation between these two speech processes is particularly complex with respect to the laryngeals, and only a consideration of both of these processes can decide the essential and non-essential articulatory features of these phonemes. (2) The particular physiological parameters change considerably for each of the groups of consonants specified in §4.2, although all are directed toward realizing the same acoustic result, and this has made the term emphasis particularly hard to define, and especially on the physiological level. (3) The fact still remains, finally, that the description of the laryngeal *ʔ h ʕ* sounds is to a large extent impressionistic and speculative, and their relation to the rest of the emphatic inventory is not appreciated. In spite of so many difficulties, it is surprising to find such close approximation and confirmation in Arabic phonological studies during a time span which connects the work of Sibawaihi of the seventh century and the first experimental attempts of Czermak of the last century, to the most recent work of the leading Arabists.

4.211. The Arabic sounds *ʔ d ʕ z* are those emphatics which exist in every Modern Arabic dialect and subsequently have received the most careful study. The native grammarians refer to these sounds as *ʔiṭbāq*, literally 'a covering of', and have described them as undergoing an articulation of the back part of the tongue against the palate, in addition to the more front articulation.¹³ Vollers, in his important "The System of Arabic Sounds", supports the ancient testimony of the native grammarians, but insists that this particular articulatory feature has disappeared, which he supported from his own experience of spoken Arabic.¹⁴ This description was attacked principally by Haupt,¹⁵ who insisted that this different place of articulation was only secondary, the term *ʔiṭbaq* subsuming glottal closure — *Kehlkopfverschluss*. The two sets of motor parameters are, of course, not incompatible, and their co-occurrence may depend on dialectal differences, but glottal closure alone can hardly be made the cause of the shift in vowel-color of adjacent vowels, which Haupt himself admits. The more recent work of Marçais has provided a detailed presentation and analysis of drawings based on x-ray photographs of emphatic and non-emphatic articulatory positions.¹⁶ His evidence includes both pharyngeal constriction and a lowering and concavity of

¹³ See Sibawaihi II, p. 455. References to Sibawaihi are from the author's *Kitāb*, in the edition by H. Derenbourg, in two volumes (Paris, 1883), which contains his most elaborate descriptions of Arabic consonants. A summary of all of the important work on emphasis until the present century is E. Mattsson, *Études phonologiques sur le dialecte arabe vulgaire de Beyrouth* (Uppsala, 1911). The most significant since then are J. Cantineau, *Le dialecte arabe de Palmyre I* (Beyrouth, 1934); R. Harrell, *The phonology of Colloquial Egyptian Arabic* (New York, 1957), Chapter 8; J. Cantineau, *Cours de phonétique arabe* (Paris, 1960), pp. 96-102, and the experimental study of Ph. Marçais, "L'articulation de l'emphase dans un parler arabe maghrébin", *Annales de l'Institut d'Études Orientales* (Faculté des Lettres de l'Université d'Alger, 7, 1948).

¹⁴ *Actes du IXe Congrès des Orientalistes* 2.130-154 (London, 1893).

¹⁵ "Die semitischen Sprachlaute und ihre Umschrift", *Beiträge zur Assyriologie I* (1890), pp. 249ff.

¹⁶ *Op. cit.*

the upper surface of the tongue, as well as a slightly retracted tongue position for the emphatic phonemes, and Cantineau has further indicated the possibility of a concomitant glottal closure.¹⁷ Harrell has found the additional feature of lip rounding in Colloquial Egyptian Arabic,¹⁸ but no evidence of a retracted tongue position which Gairdner described for Egyptian Arabic.¹⁹

The additional phonemes *q* *ḥ* *g*, together with the dentals, are subsumed by the native grammarians under the term *tafḥīm*,²⁰ which Mattsson interprets as a technical term for the particular acoustic impression of these sounds, and which he translates as 'graisse, épaisse'²¹ and which generally includes the major emphatic phonemes of Arabic, although *r* and *l* are sometimes included as well.²² Again ancient testimony and recent phonological studies are only superficially opposed in the description of these sounds, and mostly regarding *q*, which the native phoneticians describe as only a more back articulated *k*, while observers of the last century have described this phoneme as articulated by the root of the tongue against the pharyngeal wall. *ḥ* and *g* have been variously described as uvular fricatives in most modern dialect studies, although native phoneticians placed the articulation of these sounds in the highest part of the pharyngo-laryngeal cavity.

4.22. The diversity of physiological descriptions of the major emphatic sounds does not prevent the synthesis and interpretation of this information, very little of which is contradictory, in order to arrive at the essential underlying features of emphasis. Jakobson has already gone far in incorporating these diverse motor movements into the distinctive feature of flatness, although he did not at the time discuss fully the relation between motor movement and acoustic result, nor did he extract those typological features of emphasis for the different classes of emphatic sounds, typological in the sense of predictable for any phonemic system in which the contrasts may occur.²³

While the phonetic implementation of the flatness feature can either be the increased rounding of the lip orifice or retracted tongue position, i.e., velarization, which is necessarily concomitant with some degree of pharyngeal constriction resulting from the pulling back of the tongue, the acoustic feature is in any case the resulting increased length of the front oral cavity. The acoustic cue of the flatness feature is accordingly the downward shift of the second formant of the adjoining vowel, and is what Harrell terms the 'lower pitch' of the emphatic series.²⁴ The lowering and concavity of the

¹⁷ *Op. cit.*, p. 38.

¹⁸ *Op. cit.*, p. 71.

¹⁹ W. H. T. Gairdner, *The phonetics of Arabic* (London, 1925), pp. 15ff.

²⁰ See J. Cantineau, *op. cit.* (1960), pp. 96-102.

²¹ *Op. cit.*

²² Cf. J. Cantineau (1934), pp. 37-38.

²³ R. Jakobson, "Mufaxxama — the 'emphatic' phonemes of Arabic", *Studies presented to Joshua Whatmough on his sixtieth birthday* 105-115 (The Hague, 1957).

²⁴ *Op. cit.*, p. 69.

upper surface of the tongue, the retracted tongue position, and the lip protrusion all noted by analysts, although not necessarily concomitant, all serve to contribute to this lowering effect of the second formant of adjacent vowels. The lower pitch of the fricative emphatic consonants is realized by a downward shift of the major striation pattern, or frequency area, since transitional cues do not appear for most of the fricative sounds which have been studied.

The presence of a glottal release for the emphatic sounds noted first by Haupt, and more recently by Cantineau, may be due more to kinaesthetic and acoustic impression than to an actual glottal release, but the phenomenon is surely to be discussed with the tense/lax opposition, rather than voiced/voiceless, which Jakobson has set up for at least some dialects of Arabic. Mattsson himself emphasized that a glottal closure is more conceivable for *t* and *s* than for *ḏ* and *ẓ*.²⁵ Cantineau has seen the relevance of this when he asks: "Les consonnes sonores d'el-Hâmma sont-elles en même temps 'pressées' (donc plus fortes que les sonores françaises qui sont les 'douces') et ses consonnes sourdes sont-elles en même temps 'non-pressées' (donc plus faibles que les sourdes françaises qui sont les 'fortes')?"²⁶ Harrell has found a generally greater tenseness of the articulatory organs to be a concomitant feature of all of the emphatics, however.²⁷ If this tenseness extends to the pharyngo-laryngeal muscles as well, then the possibility of a glottal release of all of the emphatic sounds is not far removed, although it is clearly secondary, i.e. redundant.

4.23. There are additional physiological features and acoustic cues of the major emphatic sounds, in addition to those discussed in §4.22, features which are more directly responsible for the *tafḥīm* or 'lourdeur' of the emphatics, and which therefore serve to characterize differently the feature of flatness in Arabic from the kind of labialization, velarization or pharyngealization found in other languages, and whose primary acoustic cue is only the downward shift of the second formant of adjacent vowels. What we have in fact described thus far is not different from the flatness feature found in such languages. The flatness feature of the Arabic emphatics includes an extreme pharyngealization brought about by the retraction of the root of the tongue against the back wall of the pharynx, and faucalization, which adds to reducing the area of the opening from the pharynx into the mouth.²⁸ To the extent that the pharyngeal constriction increases the size of the frontal cavity, this appears as the lowering of the second formant of adjacent vowels. But the large amount of pharyngealization and faucalization, since they are produced behind the major oral constriction, do not

²⁵ *Op. cit.*, pp. 30-31.

²⁶ J. Cantineau, "Analyse phonologique du parler d'El-Hâmma de Gabès", *Bulletin de la Société de Linguistique de Paris* 47.64-106 (1951), p. 68.

²⁷ Harrell, *op. cit.*, p. 70.

²⁸ There are no doubt additional pharyngo-laryngeal features which add to this effect of 'lourdeur', but the question is still not fully understood. There is no direct experimental investigation of this part of the articulation, and the small amount of proprioception associated with the pharyngeal cavity adds to the vagueness of the kinaesthetic feedback available to the linguist.

directly produce the lower pitch of the emphatic consonants.²⁹ This lowering of the back surface of the tongue, pharyngealization, and faucalization as acoustic cues are only in the distortion effect on the formant structure of adjacent vowels. In fact, the kind of oral resonator which is formed by the emphatic consonants is precisely that of a low, central, back vocoid, so that the total acoustic and perceptual identification of the flatness feature of Arabic depends both on the consonant and adjacent vowel.

Confirmation of this property of the vowel phonemes in Arabic is easily found in phonological descriptions of all dialect areas, although the extent of this distortion effect is different both dialectically and stylistically, and is associated with those consonants which are said by the Arabic grammarians to prevent *imāla*, i.e., a raising of neighboring vowels to the mid-front vowel region. In the authoritative Arabic grammar of Yushmanov one finds the following description of Arabic vowels: "Arabic vowels assume the coloring of neighboring consonants in the words; emphatic consonants lend them low timbre (*a*, *ʔ* Russian *ы*, *у*) while the other consonants lend them high timbre (*ā*, *i*, *ū*)."³⁰ The terms low timbre and high timbre refer obviously to the progressively downward shift of the second formant of the vowel. Cantineau, whose descriptions of Arabic dialects are frequently rich in phonetic detail, has stated for North African Arabic that "... un rapprochement vélaire (qui) leur donne un son particulier et (qui) reporte en arrière le point d'articulation des voyelles voisines (*ā* au lieu de *a*, *ə* au lieu de *e*)".³¹ In speaking of the Syrian Arabic dialect of Tripoli, El-Hajje has found that "... cet archiphonème (i.e. *ā*) est réalisée comme un *ā* postérieur au voisinage des consonnes emphatiques ...".³² Harrell, in discussing the articulatory parameters for Colloquial Egyptian Arabic, states that, in the environment of the emphatic consonants, "The high front vowels are centralized, the high back vowels are lowered, and the low vowels are backed"; and equally instructive, that "The lip protrusion does not result in 'rounded' allophones of /i: i e: a a:/".³³

The feature of this vowel coloring effect that needs to be emphasized in connection with the IE series of allophones in the environment of laryngeal consonants is the extraordinary range of allophonic differences in the environment of the Arabic emphatic and non-emphatic consonants. Thus El-Hajje states that "... cet archiphonème (*ā*) est réalisée comme un *ā* postérieur au voisinage des consonnes emphatiques ...", while "le *h* n'exerce aucune action ni avant, ni après *ā* ..."; "... Dans toutes les autres positions l'archiphonème *ā* est réalisée comme *ā* prononcé très en avant et presque semblable à l'*e* du français ...".³⁴ Cantineau is even more explicit in this fact: "... outre le timbre *a* moyen, il peut avoir aussi les timbres *ā* (pouvant aller, en

²⁹ Cf. Harrell, *op. cit.*, pp. 69-70, where Harrell associated these pharyngeal articulations directly with the lower pitch of the emphatics, rather than with the formant structure of the following vowel.

³⁰ N. V. Yushmanov, *The structure of the Arabic language*, translated from the Russian by Moshe Perlmann (Washington, D.C., 1961), p. 12.

³¹ Cantineau, *op. cit.* (1951), p. 68.

³² H. El-Hajje, *Le parler arabe de Tripoli* (Paris, 1954), p. 22.

³³ Harrell, *op. cit.*, pp. 69-70.

³⁴ *Op. cit.*, p. 22.

passant par *o* et *o*, jusqu'à *o* formé) et *ä* (pouvant aller en passant par *e* et *e*, jusqu'à *e* fermé)".³⁵ The reasons for a greater vowel distortion of the compact (low) vowels in Arabic than of the diffuse (high) vowels is to be sought in the interplay of the relevant co-occurring distinctive features. A great lowering of the second formant of the grave diffuse vowel (*i*) attenuates the diffuse/compact opposition by bringing the formant toward the compact region; the already maximal front cavity for the acute diffuse vowel (*u*) necessitates the compensatory lowering (or raising of the first formant) of these vowels, which produces a similar effect — that of bringing the two formants closer together. The absence of a grave/acute opposition for compact vowels (i.e., palatals vs. velars) however does not endanger the binary code since a lowering of the second formant of compact vowels does not leave the compact area of the spectrum, nor coalesce with a non-occurring palatal contrast. Or as Jakobson-Fant-Halle have put it: "This process (i.e., emphasis) affects the diffuse acute (dental) consonants and attenuates their acuteness, while in the compact consonants it fuses with the primary opposition grave vs. acute and intensifies the distinction between palatals and velars by imposing upon the latter a very strong pharyngeal contraction".³⁶

4.3. The description of the Arabic sounds *ħ* and *ʕ* by native phoneticians are surprisingly well in accord with the excellent experimental study which Czermak undertook in 1886 with the aid of the laryngoscope.³⁷ The articulation of these sounds was placed originally in the middle portion of the laryngo-pharyngeal cavity, and thus higher in articulation than the true glottals *h* and hamza (*ʔ*), and were further described as intermediary between stops and fricatives, the first voiceless, the second voiced.³⁸ Czermak's invaluable observations concerning the production of Arabic *ħ* and *ʕ* leave little room for speculation about the nature of these sounds, and in addition provide valuable clues to the kind of pharyngeal articulation of the oral emphatics (presumably the *tafḥīm*) that has not been directly examined experimentally. Czermak has described the Arabic *ħ* thus: "Verschliesse ich die dreispaltige fissura laryngis, durch aufeinander drücken ihrer Ränder, und treibe ich die Luft kräftig gegen dieselbe an, so entsteht ein harter eigenthümlich gequetschter Ton. ...".³⁹ Mattsson has attempted to explain more clearly the articulatory configuration which Czermak emphasized for *ħ*: "Cette ouverture à trois fentes se produit lorsque l'épiglotte s'abaisse et couvre les fausses cordes vocales et les cornes supérieurs des cartilages artynoides".⁴⁰ Both articulatory descriptions, however precise and accurate, are not sufficient because they fail to explain which of these articulatory movements are primary and which are secondary, or in other words, what acoustic result they

³⁵ *Op. cit.* (1934), p. 74.

³⁶ R. Jakobson, C. G. M. Fant, M. Halle, *Preliminaries to speech analysis* (M.I.T., 1955), p. 34.

³⁷ W. Czermak, *Gesammelte Schriften I* (Leipzig, 1879), p. 754.

³⁸ This description is particularly clear in the *Al-mufaṣṣal* of Zamaḥṣārī, in the edition of Broch (Christiana, 1879), p. 188.

³⁹ *Op. cit.*, p. 552.

⁴⁰ *Op. cit.*, p. 42.

are directed to provide. For this it is necessary to indicate completely the articulatory mechanism involved in extreme pharyngealization (i.e., the Arabic *tafḥīm*). This pharyngeal contraction is accomplished directly by the muscles attached to the base of the tongue on their upper surface, and to the ridge of the hyoid bone on their lower, from which is supported the larynx. The epiglottis is attached at its lower edge to the thyroid cartilage directly above the vocal chords, but by a membranous attachment on its upper portion to the base of the tongue. The effect of drawing back the base of the tongue by these muscles is to draw back the hyoid bone, but the hyoid bone and larynx can be drawn toward the pharyngeal wall by the inferior and middle constrictor of the pharynx, the only use of which muscles in speech sound is to vary the size of the pharyngeal cavity in its diameter.⁴¹ This action, then, necessarily lowers the epiglottis tightly over the glottis, which Czermak was able to observe. The friction noise which is modulated through the oral cavity set in this position is created at the open muscular processes of the glottis (i.e., the arytoids) and is the same noise sound as for *ħ*. As Mattsson has observed: "Comme, selon les indications expresses de Czermak, le frottement produit en chuchotant est complètement indentique au frottement qui accompagne les diverses variétés de *ħ*, le *ħ* arabe serait donc ce que nous entendons par chuintement ou chuchotement rauque".⁴² The Arabic *ʕ* is normally taken to be the voiced (lax) counterpart to *ħ*, and Czermak adds to his above description for *ħ* that "in dem (i.e. *ʕ*) namentlich die Ränder der verticalen Spalte (zwischen den Innenrändern der Arytaenoidknorpel), ganz ebenso wie sonst die Ränder der verengten wahren Stimmritze, in deutlich sichtbare tönende Schwingungen gerathen".⁴³ Sievers has insisted that the vocal cords are so tightly held that they vibrate only in irregular beats (laryngealization).⁴⁴ Both ancient testimony and Mattsson insist that the place of articulation for *ʕ* is clearly lower in the pharyngeal cavity than for *ħ*, which must be taken to mean that the larynx is raised more for *ħ* than for *ʕ*.⁴⁵

The Arabic *ħ* and *ʕ* sounds are, therefore, made up of the same kind of extreme pharyngealization as the oral emphatics, but not as secondary superimposed articulations, but as primary features modulated through the oral cavity by means of either glottal friction (*ħ*) or voice, and are therefore in a typological sense as implicationally related to a phonemic system with emphatic/non-emphatic contrasts as the *h* sound is to a phonemic system with aspirated/non-aspirated contrasts. There is, then, no contradiction in indicating the relations among Arabic *ʔ* *ħ* *ħ* and *ʕ* both as *ʔ*:*ħ* = *ʕ*:*ħ*, and as *ʔ*:*ʕ* = *ħ*:*ħ*, the first proportion being that of lax to tense, the second that of non-emphatic to emphatic. It is now not difficult to understand why the opposition emphatic/non-emphatic has not been traditionally applied to the *ʔ*/*ʕ* and *ħ*/*ħ* contrasts: these sounds are autonomously simple while the pairs *t*/*t̤*, *d*/*d̤*, etc., are complex, with the emphasis superimposed over a whole series of orally articulated sounds.

⁴¹ See R-M. S. Heffner, *General phonetics* (Madison, 1960), pp. 25-28.

⁴² *Op. cit.*, p. 42.

⁴³ *Op. cit.*, p. 552.

⁴⁴ E. Sievers, *Grundzüge der Phonetik*, fourth edition (Leipzig, 1893), p. 172.

⁴⁵ Cf. R. Jakobson, *op. cit.*

Now what is most important in connection with the IE laryngeals is that the vowel-coloring effect found in the oral emphatics is even more intimately associated with the *ḥ* and *ʕ* sounds than with the former, since the most important acoustic (perceptual) cue of the pharyngealization of these two sounds is the oral cavity resonance of the following vocoid. That is to say, while the oral cavity can assume any position following the *h* sound alone, it will be necessarily in the low central back configuration following the *ḥ* and *ʕ* sounds. It is, therefore, contradictory to the nature of these sounds as consonantal phonemes for there to be sequences of, say, *ḥe-*, *ʕe-* with the same allophone of *e* as occurs in the environment of non-emphatic sounds, and even non-laryngeal emphatic sounds. There is, accordingly, almost universal indication that the *ḥ* and *ʕ* sounds in Arabic of all dialectal areas prevent *imāla*, and are in addition often classified as inherently *tafḥīm* as well. The incompatibility of *ḥ* and *ʕ* from patterning with non-low, central back vowels is, of course, a contrastive incompatibility, not an absolute one, since *ḥ* and *ʕ* pattern with Arabic *i u* as well as *a*. The same vowel allophone which occurs predictably adjoining the oral emphatics occurs in the environment of *ḥ* and *ʕ*, but the relative difference in the allophones of Arabic *a* adjoining *h* and *ḥ* is instructive on this point, for one may well ask, if *ḥ* favors the allophone *a*, how sequences of *ha-* and *ḥa-* could be kept distinct. Now it is the case for all dialects of Arabic which I have examined that *h* and *ḥ* (and *ʕ*) never fall into the same subset of phonemes with regard to vowel-coloring in any given dialect: i.e., for any one dialect, if [*ha-*], then [*ḥa-*], if [*he-*] (i.e., if *h* does not prevent *imāla* whatsoever), then [*ḥa-*], and if [*hi-*], then [*ḥi-*], and so on.

4.4. The Arabic emphatic and laryngeal sounds that we have described are important for the IE system of laryngeals to the extent that they permit general typological statements such that one can claim that (1) given any phonemic system with similar phonemic contrasts, one could state necessarily that they will show such general phonological features; or (2), which is more important for IE, given any synchronic set of such allophonic features, one could assign them to this set of phonemic contrasts. Concerning *ḥ* and *ʕ*, then, the inherent effect of vowel-color distortion which these sounds pattern with, if it can be isolated for any proto-language, can be assigned, at the very least as a working hypothesis, to these sounds, since there is a causal, not accidental relation between these sounds and the kind of effects they produce on adjoining vowels. The allophonic range of IE *e* adjacent to laryngeals as a synchronic fact can be understood by positing for the laryngeals *H*₁, *H*₂, and *H*₃ the values *h*, *ḥ* and *ʕ*, or better, the distinctive feature matrices associated with these sounds, which at the same time subsume the kinds of necessary physiological and acoustic parameters which we have discussed. Thus IE *H*₁ (*h*) can be said to have had no effect on adjoining vowels, while both IE *H*₂ (*ḥ*) and *H*₃ (*ʕ*) produced *a*-color and *o*-color respectively. The difference in inherent coloring power of *ḥ* and *ʕ* cannot be totally explained until the question of the syllabic nature of the laryngeals is discussed, but there has already been evidence to associate greater backing and greater pharyngealization with a high

position of the larynx, and this is certainly due to the more tense character of ʕ than of h , noted especially by Sievers.

In conclusion, it needs to be emphasized that the assignment of the values h h and ʕ to IE H_1 , H_2 and H_3 is not a claim that the sound found in modern Arabic dialects are precisely those which existed in IE. It is rather the inherent characteristics of those glides h h ʕ which can have both sub-oral and oral features simultaneously that make them to such a high degree of probability those sounds which underlie the IE laryngeals. The parallel evidence in Arabic phonology is only useful insofar as it can be interpreted within a general typological consideration of these speech sounds.

THE VOCALIC NATURE OF THE INDO-EUROPEAN LARYNGEALS

5.0. The present chapter attempts to continue the phonological investigation of the PIE laryngeals by dealing with the question of shwa primum — i.e., the laryngeal consonants in their role as syllabically implemented phonemes. If it can be at least shown that there is enough evidence to consider the laryngeals as part of the IE sonants — i.e., as part of the class of phonemes which is implemented both as syllabic and non-syllabic, then this general property can be made part of the synchronic evidence in IE with which to delimit the nature of the laryngeal phonemes. The *coefficient sonantique* nature of the laryngeals, together with the laryngeal allophonic vowel-coloring and compensatory vowel lengthening already discussed, are the classically defined characteristics of the laryngeal theory inherited from de Saussure. This value of *coefficient sonantique*, however, has either been avoided by a completely algebraic or notational approach, or has been arbitrarily explained with the help of various reduced vowel theories. The value of the algebraic approach is nowhere more apparent than in this question of the syllabic implementation of the laryngeals. Benveniste's insistence, e.g., that "À tout point de vue, *a* se comporte comme une sonante, avec forme vocalique ou consonantique",¹ has enabled him to build a rigorous and consistent theory of the IE root which has brought order to a host of seemingly isolated problems.² If Benveniste's assertion, a fundamental part of the *Mémoire* of de Saussure, is necessarily the case, then the phonological properties of the laryngeals must include this inherent dual implementation as syllabic and non-syllabic phonemes. But since any set of features for the laryngeals can be justified by at least partly begging the question with the use of a reduced vowel in the environment of the laryngeals in the zero grade of syllables, it will be necessary to discuss the question of shwa secundum and the Sievers-Edgerton view concerning the behavior of the IE sonants, and especially with regard to the laryngeal phonemes.

¹ E. Benveniste, *Origines de la formation des noms en indo-européen* (Paris, 1935), p. 149.

² There is no denying the success of Benveniste's theory of the IE root, which, of course, had in various aspects been presented since de Saussure's *Mémoire*, although most recently Benveniste's strict limitations about root structure have been criticized as being too severely restrictive. Cf. J. Puhvel, *Laryngeals and the Indo-European verb* (Berkeley, 1960), pp. 31-32; W. Cowgill, Review of J. Puhvel, *op. cit.*, *Language* 39.248-270 (1963), 251-252.

5.1. De Saussure's solution to the problem of IE quantitative ablaut and the alternation of \bar{e} \bar{a} \bar{o} with generally a but Indo-Iranian i as the result of older sequences of $*e/oH_1$, H_2 , H_3 alternating with $*H$ in the zero grade — is stated in the *Mémoire* thus: " a_1 (i.e., e) étant expulsé, la racine demeura sans voyelle dans le cas où elle ne contient point de coefficient sonantique. Dans le cas contraire, le coefficient sonantique se montre à nu, soit à l'état autophthongue (p. 9), et fournit une voyelle à la racine. Les phonèmes A et Q [and Möller's additional E] sont des coefficients sonantiques. Ils ne pourront apparaître à nu que dans l'état réduit de la racine".³ But although this aspect of the laryngeal theory has become for the most part undeniable in showing the overall unity of the IE quantitative ablaut pattern, the addition of the laryngeals (or laryngeal, if shwa primum is to be considered as the neutralization of the laryngeal consonantal distinctions) to the already established sonants $y w r l m n$ has brought with it the vexing question of the vocalization (or better syllabic implementation) of the laryngeals. The complete morphological parallel in quantitative ablaut between the normal grade of sequences of C_1VC_2 where C_2 included $y w r l m n$, and sequences of C_1VC_2 where C_2 included the laryngeal consonants, could understandably be accounted for phonologically only with great difficulty. The root alternations $er ey ew$... in the normal grade and ryw ... in the zero grade could be interpreted as a perfectly regular non-syllabic/syllabic opposition according to consonantal environment. That certain vocoids ($i u$) and contoids ($l r m n$) have the requisite relative sonority to function as both crest and margin phonemes posed no problem in phonological interpretation.⁴ But the views concerning the phonological nature of the laryngeal consonants — including all of the various oral, pharyngeal and glottal consonants — which have been proposed since the *Mémoire* of de Saussure have been difficult, in most cases impossible, to reconcile with the other IE sonants on the basis of the degree of relative sonority which these proposed sounds subsumed. It was hardly possible to simply assert true vocalic function for the laryngeals in the same way as for the other IE sonants, especially since the consonantal properties of the laryngeals were more marked than for the other IE sonants. This is seen clearly enough in the contribution of the laryngeal theory to the description of the so-called disyllabic

³ F. de Saussure, *Recueil des publications scientifiques* (Heidelberg, 1922), p. 127. De Saussure's "L'état réduit de la racine" is not to be taken as an autonomous reduced grade in contrast with the zero grade, as Holger Pedersen wrongly interpreted: "Auf Ferdinand de Saussure geht die Lehre zurück dass ein langer Vokal als Grundstufe einer Ablautreihe auf e mit einem folgenden Laryngal beruht, der in der Reduktionsstufe zu a geworden ist, in der Schwundstufe aber durch Null vertreten ist" (*Hittitisch und die anderen indo-europäischen Sprachen* [Copenhagen, 1938], p. 179). For de Saussure only one weak grade existed for IE, characterized by the expulsion (deletion) of a_1 (= E), and the absence of shwa primum in the Skt. *dadmāh* (Pedersen's 'Schwundstufe'), as opposed to the Lat. *datus* (Pedersen's 'Reduktionsstufe'), is attributed to the particular nature of the implementation of schwa primum and to the phonetic surroundings: "Cette voyelle (= a_1), disons-nous, devait être très faible. On aurait peine à comprendre autrement comment dans plusieurs langues différentes elle tend à être supprimée. On a en sanskrit les formes comme *da-d-mas*, *da-dh-mas*, *a-tta* ..." (*op. cit.*, p. 167). See also §5.24.

⁴ But cf. §5.23.

bases which, when made to conform to IE root structure as a whole, brought to light distributional properties of the laryngeals not shared by the other IE sonants. Thus alternations of the type **terH/treH* alongside **perk/prek* establish the two most frequent types of IE roots which Lehmann observed, CeRC and CeRH, where the laryngeals share this distributional slot following resonants with the other IE consonants.⁵

5.11. In spite of the evidence in favor of the at least partly consonantal function of the laryngeals, both in terms of distribution and in the various phonological features used to describe them, most writers on the laryngeals, including significantly de Saussure, have attempted to explain the vocalic or syllabic property of the laryngeals, which is the very basis of IE quantitative ablaut, or in the purely historical sense, to account for the development of shwa primum, or the laryngeals between non-syllabics in the various IE languages.⁶ De Saussure himself was distinctly aware of the seemingly contradictory evidence that the distribution of the laryngeals showed within IE root structure — evidence which pointed to both a consonantal function, and to a more open or vocalic function. Thus de Saussure states that “pour que le phonème *A* remplît un rôle morphologique parfaitement identique avec celui de *i* ou *u*, il faudrait, en vertu du même principe qui ne permet point de racines finissant par *in*, *ir*, etc., qu’aucune racine ne montrât *A* SUIVIE D’UNE SONANTE. Mais ici semble cesser le parallélisme de *A* avec les autres coefficients sonantiques, parallélisme qui du reste, considéré au point de vue physiologique, est assez énigmatique”.⁷ Nonetheless, de Saussure took great pains to account both for the occurrence of the laryngeals between non-syllabics in a way parallel to the non-syllabic/syllabic implementations of the remaining IE sonants, and to explain the IE reflexes of shwa primum in the various IE languages: “On est donc amené à conclure à la diversité, sinon tout à fait originaire, du moins proethnique du phonème *A* et de la voyelle qui a donné l’*i* indo-iranien. Nous croyons que cette voyelle était une espèce d’*e* muet provenant de l’alternation des phonèmes *A* et *Q* Que cette voyelle indéterminée soit une dégénération des voyelles *A* et *Q*, nous ajoutons par hypothèse seulement de ces voyelles, et non pas, comme on pourrait croire, un phonème distinct de tout autre dès l’origine”.⁸ Thus de Saussure postulates a

⁵ W. Lehmann, *Proto-Indo-European phonology* (Austin, 1952), pp. 106-107. Cuny, in his important “Notes de phonétique historique: indo-européen et sémitique”, *Revue de phonétique* 2.101-132 (Paris, 1912), (esp. pp. 107-114), had already drawn attention to the consonantal patterning of the laryngeals, in addition to their sonantal distribution, and more comprehensively than Lehmann.

⁶ The term ‘vocalization’ of the laryngeals ought to be abandoned, because it now has assumed too many prejudices against the laryngeals being capable of actual syllabic realization in IE. If it refers to the attested vowel reflexes of shwa primum in the IE languages, then it begs the question about the synchronic state of affairs in IE, and therefore has no real integrated diachronic meaning either.

⁷ *Op. cit.*, p. 170.

⁸ *Op. cit.*, p. 167. Cf. G. Messing, “Selected studies in Indo-European phonology”, *Harvard studies in classical philology* 56-57.161-232 (Cambridge, Mass., 1947), pp. 186-190.

neutralization of the contrast *A/Q* (and we should add *E*) between non-syllabics, realized as “une espèce d'*e* muet ... voyelle incolore, affaiblie”.⁹

Although it is clear that de Saussure insisted on syllabic and non-syllabic function for the laryngeals as well as the other IE sonants, his explanation does not integrate this dual syllabic role phonologically, although it is interesting to note that he took greater pains to specify phonetically the laryngeals as syllabics than as non-syllabics. Cuny was the first writer on the laryngeals to attempt to integrate the laryngeals as syllabics into his general phonological treatment of these phonemes. He defined “*A* consonne ... comme une sort d'*h* dont la durée venait s'ajouter à celle de la voyelle précédente comme dans le type français *tête* venant du Latin vulgaire *testa* par un intermédiaire **tehte* ... ou comme *rās* arabe vulgaire de classique *raʔs* ‘tête’”.¹⁰ His description of the laryngeals as syllabics, based on the system of Semitic pharyngeal and laryngeal sounds which he postulated for IE, however, was vague and uninformative. He states that “les caractères communs à *r*, etc. ... et à *A* étaient la sonorité, i.e. continuité et la possibilité de vocalisation. Ce qui les différenciait, c'est que *A* possédait à un moindre degré cette dernière faculté et qu'il avait une articulation moins arrêtée (c'était une continue beaucoup plus ouverte)”.¹¹ Surely this is not sufficient, since it merely states some of the conceivable phonological properties, hardly delimitative, that the laryngeals as syllabics should have. Cuny's statement, however, about the laryngeals as syllabics in view of the triple reflex of shwa primum in Greek is significant, although he does not explain how the nature of the sounds in question function in the syllable peak: “Ceci n'empêcherait nullement, on l'a vu, les trois phonèmes *E*, *A*, *Q* d'être comme le dit M. Möller, des laryngales dans le genre de celles que possède le sémitique. Un phonème peut être en effet laryngal et buccal: c'est le cas des consonnes emphatiques de l'arabe, c'est même celui de toutes nos sonores et de toutes nos voyelles (sauf le cas exceptionnel des voyelles sourdes)”.¹²

Walter Couvreur, who accepted the Semitic values which Möller and Cuny had earlier attributed to the laryngeals, makes a somewhat more careful, although in the end equally vague and uninformative attempt at explaining the laryngeals as syllabics. He thus postulates that *ʔ* (= *h*₁), except in Hittite, can weaken to a mute *e*, which assumes that quality under the influence of the alternating full-grade *e*. Since Couvreur postulates a coalescence of *h* and *ʔ*, when consonantal, to *ʔ*, he assumes the same for the zero grade, and therefore the same result for the three laryngeals between non-syllabics. The imprecise nature of this mute *e* allows him to explain the ultimate transformation of this vowel into *a* or *i*.¹³ There is, however, not a single word about the inherent possibility of these laryngeals to function as vowels, or as syllabics, and the ultimate falling together of the laryngeals with *ʔ* in the zero grade as well as the

⁹ *Op. cit.*, p. 168.

¹⁰ *Op. cit.*, p. 103, fn. 3.

¹¹ *Ibid.*

¹² *Op. cit.*, p. 124.

¹³ W. Couvreur, *De hettitische h* (Louvain, 1937), pp. 257-283. Cf. also Messing, *op. cit.*, pp. 177-178.

normal grade is hardly sufficient. Indeed, Couvreur's treatment of this problem seems hardly less algebraic than Benveniste's, and would carry more conviction without the mute *e* as the final solution.

5.2. Such attempts to handle the problem of laryngeals between non-syllabics as we have discussed have not been phonologically convincing, and in this respect they have not produced any more understanding of the problem than the purely algebraic solutions have provided. Since either the phonological values attributed to the laryngeals have been both vague and impressionistic, or were clearly irreconcilable with the other sonants as phonologically capable of functioning either as syllabics and as non-syllabics, the explanations provided for the laryngeals in the zero grade of syllables have been more *ad hoc* than convincing, and certainly not readily derivable from the consonantal descriptions of the laryngeals. Kuryłowicz, judging from the evidence that the laryngeals patterned not only like the IE sonants, but additionally in the sequences *ə* + stop and sonant + *ə*, concluded that in terms of aperture (hence sonority), the laryngeals held an intermediary place between the IE sonants and stops.¹⁴ His further reasoning in its main points provided more or less the kind of treatment of the laryngeals between non-syllabics of those Indo-Europeanists who have worked with some form of a reduced vowel theory: "Si l'on admet que *ə* possède une aperture plus petite que celle d'une sonante, il est évidemment difficile d'expliquer *ə* (indoir. *i* eur. *a*) par la vocalisation de *ə*. Du reste même à la vocalisation de *r*, *l*, *m*, *n* la consonne ne se perd presque jamais dans les langues indo-européennes (si l'on excepte *ṛ*, *ṛ* > *a* en indo-iranien et en grec). Dans le cas des *ə* dont le caractère consonantique est plus accentuée que celui de *r*, *l*, *m*, *n*, il ne peut donc s'agir que d'une VOYELLE ANAPTYCTIQUE développée à la rencontre de trois consonnes (*ə* et les deux consonnes voisines)".¹⁵ But this possibility of an automatic anaptyctic vowel realization of the syllabic feature when concomitant with the laryngeals cannot completely be separated from the more general problem of shwa secundum and the Sievers-Edgerton description of the IE sonants, and it is this problem which we must discuss first.¹⁶

5.21. The automatic alternations which Sievers-Edgerton have accounted for have been summed up most recently by Hoenigswald: "Given the following groups of corresponding phonemes or sequences of phonemes in Sanskrit, Greek, and Germanic: (1) *w*/*ṽ*/*w*, *r*/*p*/*r*, *n*/*v*/*n*, (2) *u*/*ṽ*/*u*, *r*/*pa*~*ap*/*ur*, *a*/*a*/*un*, and (3) *uv*/*ṽ*(*f*)/*uv*, *ir*(*ur*)/*ap*/*ur*, *an*/*av*/*un*: the segments of sound lying behind group 1 were once in complementary distribution both with those lying behind group 2 and with those behind group 3. For the older stages of Indo-European, therefore, one needs to reconstruct only three entities: *w*, *r*, *n* (and likewise *y*, *l*, *m* for other sets not listed here), each with three

¹⁴ See his "Les effects du *ə* en indoiranien", *Prace filologiczne* 11.201-243 (1927), p. 233.

¹⁵ *Ibid.*

¹⁶ Cf. also A. Martinet, "Les 'laryngales' indo-européennes", *Proceedings of the Eighth International Congress of Linguists* 36-61 (Oslo, 1957), p. 53.

positional variants of varying syllabicity".¹⁷ Edgerton has established the following formulae, which indicate the automatic realization of the syllabicity feature of single sonants and of sequences of sonants (t = any consonant, e = any vowel):¹⁸

- | | | |
|--------------------|--------|--------|
| (1) one sonant: | tit | etye |
| | eye | ktiye |
| | eyt | ētiye |
| (2) two sonants: | eywe | etyut |
| | ēyuwe | ētiyut |
| | | ktiut |
| | etyuwe | |
| | ētiwe | eyut |
| | ktiwe | eyut |
| | ktiwe | ēyut |
| (3) three sonants: | eywit | eywiye |

Thus the regulation of the syllabicity feature must conform to the general pattern (V)C<C>VC(V), with sequences of consonants limited to two beginning after pause — i.e., the obligatory setting up of heavy syllables, hence C<C>, after pause, which has as effect the impossibility of rising diphthongs composed of sonants — etyut but not *etiwt — and the elimination of the hiatus feature by regular insertion of the consonantal value of the preceding sonant for all three groups. It would, therefore, be more exact to talk about IE phonemes *r l m n y w* which do not subsume any feature of syllabicity, and to describe the three sets of correspondences listed above as a conditioned three-way phonemic split in the various IE languages.¹⁹

5.22. The real nature of Edgerton's interpretation of the IE semivowels and the place that a theory of shwa secundum holds in this problem can be seen only after the nature of the IE shwa secundum is examined. The evidence which Hirt, one of the leading exponents of shwa secundum, has presented can be summed up roughly by the following general categories, and can be made the basis for the subsequent discussion concerning *ə*: (1) before sonants, where *ər* = *r*, etc. of Edgerton; (2) instances of vowels which turn up in the zero grade of roots or in particular consonantal environments, e.g., Gothic *gibans* < **ghbh-onos*; Lat. *coctus*, Skt. *paktáh*, Gk. *πεπτός* < **pqu-tós*; Gk. *πίτνημι* < **pt-néH-mi*, Lat. *pateō*; (3) before *r*, *n* + *j*, e.g., Gk. *βαίνω* < **g^wnyō*.²⁰ Hirt's motivation for insisting on a reduced grade (his

¹⁷ Hoenigswald, "PA, ΔFΔAE, ΔAEYΣ, and the semi-vowels", *Language* 29.288-292 (1953) 288.

¹⁸ The most comprehensive survey that Edgerton provided is "The Indo-European semi-vowels", *Language* 19.83-124 (1943); but earlier, also "Sievers's law and IE weak-grade vocalism", *Language* 10.235-265 (1934); and most recently, "The semi-vowel phonemes of Indo-European: a reconsideration", *Language* 38. 352-360 (1962).

¹⁹ This assertion is to a degree dependent on the kind of phonemicization one accepts for IE, so that if one were to insist that syllabic vs. non-syllabic implementation could not play any allophonic role, this statement could not hold.

²⁰ Hirt, *Indogermanische Grammatik II* (Heidelberg, 1921), pp. 76-102.

'*Reduktionsstufe*') in addition to a zero grade (his '*Schwundstufe*') is early a preoccupation with or assumption about the historical processes which underlie the origin and development of quantitative ablaut (normal vs. zero grade, but not lengthened grade here). What Hirt did not do was first to arrive at the best description of the facts concerning quantitative ablaut and the syllabicity implementation of the sonants for that synchronic period of IE after the differences in quantitative ablaut had become part of the morphophonemic pattern of IE, apart from the question of assumed historical antecedents. He thus assumes that the zero grade of roots must have passed through a stage of merely weakening from IE full grade vowels (which is to a large extent an argument concerned with how given stages of a language are arrived at, which is another thing from the synchronic description of the facts): "Nun ist es aber ganz klar, dass der Ausfall eines Vollvokals nicht mit einem Male erfolgt, sondern Übergangsstufen voraussetzt. Der unbetonte Vokal wird reduziert, er wird in manchen Sprachen zu einem sogenannten Murmelvokal, wie wir ihn in Deutsch *Liebe* haben".²¹ If what Hirt claims is the case, then one ought to find some trace of it in the synchronic description of IE after the origin of quantitative ablaut, or at least one ought to find it profitable as a purely *a priori* assumption to explain the historical development of certain morphological patterns in IE.²²

5.23. Hoeningswald has stated that "Perhaps it should be pointed out that our *ə*, being automatic, has nothing to do with similar notations used for true reduced grades, where the location of the remnant vowel is determined by the location of the full-grade vowel in other forms of the paradigm".²³ Thus he makes the crucial distinction between shwa secundum as representative of a true ablaut (quantitative) grade, in which the full vowel in some other forms of the paradigm or the vowel of the morphological base form, is weakened under stateable phonological (i.e., accentual) or morphological conditions (i.e., conditioned by the presence of some following or preceding morpheme, but not by its phonological shape); and shwa secundum as the notational convenience or claim about the syllabicity implementation of sequences of phonemes, and therefore determined entirely by phonetic environment. Thus justification for shwa secundum in IE can be either its function as an autonomous ablaut grade, or as an argument in favor of a certain physical implementation of the syllabicity feature or at least a notation of greater convenience in discussing the history of the IE sonants in the various IE languages than the parallel claim of Sievers-Edgerton.

In order to justify the use of shwa secundum as an autonomous ablaut grade, it

²¹ *Op. cit.*, p. 78.

²² In addition to the Edgerton work, see W. Petersen, "The evidence for shwa secundum in Latin and Greek", *Language* 14.39-59 (1938) and J. Kuryłowicz, *L'apophonie en indo-européen* (Wrocław, 1956), pp. 97-130, for a criticism of the reduced grade as an autonomous ablaut grade chronologically coexistent with zero grade vocalism, and an *a priori* attempt to integrate an earlier reduced grade into the development of quantitative ablaut, respectively.

²³ *Op. cit.*, p. 292, fn. 1.

should be necessary to predict either prosodically or grammatically, the environments in which the full-grade vowel of the underlying base form of a sequence of morphemes (Hoenigswald's "determined by the location of the full-grade vowel in other forms of the paradigm") is weakened (or better rewritten as a reduced grade, since weakened has too many historical connotations), as opposed to being rewritten as zero, i.e., deleted. Thus to begin with the presumed occurrence of shwa secundum before semivowels, we may take the Skt. doublets *syám* (after a light syllable in the Veda) and *siyám* (after a heavy syllable, although Vedic tradition preserves only the spelling *syám*²⁴), the second of which Hirt would reconstruct as **s_yám*. Now if the second variant is a true ablaut grade, then the underlying base form ought to be **H_{se}-yéHm* when it is certainly **H_{es}-yéH-m*, so that one would somehow have to explain the shift of **s_yám* to **s_yám*. But the conditions for such a shift can be neither the prosodic or grammatical environment, since the normally accented athematic optative singular suffix *-yā-* (< **-yeH-*) is the condition for the loss of the full-grade vowel of the root syllable (hence zero grade), but can only be the phonetic surrounding, in this case, the preceding heavy syllable. Thus Hirt's original prosodic rule about the contrasting environments of reduced and zero grade — reduced grade immediately before the accent, but zero grade immediately following the accent — can never be valid for such doublets.²⁵

Kuryłowicz's early use of the reduced grade and zero grade in the environment of the laryngeals is another example of the fact that the reduced grade cannot be justified as an ablaut grade based on the presence of the full-grade vowel.²⁶ Here Kuryłowicz assumed a partial "Schwebeablaut" variation in the reduced grade, in which the root **dheH-* e.g., has in the reduced grade both **dh_eH-* and **dhH_e-*, corresponding necessarily to full-grade forms **dheH-* and **dhHe-*. Although the zero grade ought to be **dhH-* (even apart from the question of the particular implementation of, say, *H*, before a consonant), Kuryłowicz gives **dh_eH-* as the zero grade initially, **dh-* internally corresponding to the full-grade form **dheH*, but **dhH-* as the zero grade, **dhH_e-* as the reduced grade of the "Schwebeablaut" **dhHe-*. Only the last variant **dhH-* is supposed to give the normal correspondence in Indo-Iranian of shwa primum. This startling array of weak grade variants obviously has nothing to do with a full-grade form **dheH*, and nothing to do with the conditions of zero grade vocalism as normally understood, but are set up directly to account for the existence of such variants as Skt. *dadhmáh* (without medial vowel), Skt. *ditáh* but Av. *dāta*. Kuryłowicz was much clearer in his first discussion of the same problems when he explained the alternations Skt. *ditáh*, Av. *dāta* from **dH_e-* and **d_eH-* respectively,

²⁴ See especially, Edgerton, *op. cit.* (1934).

²⁵ Even H. Güntert, one of the leading exponents of the shwa secundum theory, must admit that: "Für andere Stellungen aber, also in mehrsilbigen Wörtern, sehe ich nur unüberwindliche Schwierigkeiten, wenn man daran gehen will, Reduktions- und Schwundstufe durch scharfe Gesetze von einander zu trennen" (*Indogermanische Ablautprobleme* [Strassburg, 1916], p. 123).

²⁶ See J. Kuryłowicz, *Études indoeuropéennes I* (Cracow, 1935), pp. 57-76; also Messing, *op. cit.*, pp. 187-189 for the following discussion.

with the anaptyctic vowel “déterminée par le sandhi” — i.e., by the presence of a preceding light or heavy syllable — and therefore having nothing to do with quantitative ablaut, although Kuryłowicz necessarily insists on the physical implementation of ə for the sonants in choosing to explain the Avestan full-grade forms *dāta*, etc., alongside Skt. *ditáh* as the result of different generalizations of sentence doublets.²⁷

Such examples as Skt. *paktáh*, Gk. *πепτός*, Lat. *coctus*, from the form which Hirt reconstructs as **pəqʷ-tós*, beside other perfect passive participles — Lat. *vīsus*, Skt. *vittáh* from **vid-tós*, but necessarily **vid-tós* by Hirt, lead to more general objections concerning a reduced ablaut grade. In both forms of the participle we should expect to find a reduced grade according to Hirt's prosodic rule, although Hirt does not obviously assign the conditioning factor of reduced grade vocalism to the perf. pass. ppl. suffix *-tós* for the preceding root syllable. Only two expedients can be descriptively handled for this variation: (1) One could consistently preserve, as Hirt would be required to do according to his prosodic rule for reduced and zero grade vocalism, the reduced grade for **vid-tós* as well as for **pəqʷ-tós*, but additionally state the automatic environments (before IE sonants) where ə is deleted; or (2) assign the conditioning factor of zero grade vocalism to *-tós*, but additionally state the environments (neighboring non-sonants) in which an automatic anaptyctic vowel is required. Clearly the second, in view of the frequency of root patterns, and the inherent sonority feature associated typologically with the sonants (by which fact Edgerton showed conclusively that ə in the environment of semivowels is hardly acceptable), is the better solution. But if there were no question of contrasting zero grade and reduced grade vocalism to begin with, one could call the vocalism of the root syllable preceding *-tós* anything at all, although in terms of IE ablaut, the second solution is still the better one. But we are supposed to find the zero grade only immediately after the accent, so that again considering the cases where a ə crops up when we should expect no full-grade vowel, it would be necessary to state those environments in which an automatic vowel appears. Now the two sets of limiting environments thus necessary in view of this supposed opposition between reduced and zero grade vocalism are entirely complementary — as well as redundant — so that one must again accept that description which invariably assigns zero grade vocalism where Hirt and everyone else expects it, and to give only once those non-sonantal environments which require a special handling of the implementation of the syllabicity feature. These arguments, of course, do not change if one were to take into account some of the even more far-fetched conditioning factors that have been presented. But since so many of these arguments are diachronically motivated, and hardly possible to treat as synchronic

²⁷ *Op. cit.* (1927), pp. 233-235; (1935), pp. 57-72. Kuryłowicz, however, has given up considering the full-grade Iranian forms such as Av. *dāta*, but Skt. *ditáh*, as different generalized forms of an original difference in ablaut vocalism, or automatic anaptyctic vowel. He now explains the Iranian forms as a morphological replacement of an original *Ti-tá* (i.e., *Tā-tá*) by the full-grade form *Tā-tá*, and one instance of a regular loss of contrast between full grade and zero grade forms of set roots of the type *Tarə*, *Tamə*, *Tanə* (*op. cit.* 1956, pp. 244-252).

conditioning factors, the use of such diachronic corrections to Hirt's prosodic rule only weakens the case for an autonomous reduced grade vocalism.

The justification for the use of a reduced vowel, if it has nothing to do with an autonomous ablaut grade, must be sought in the question of the precise physical implementation of the IE feature of syllabicity, or as the most useful notational device concerning the syllabification of phoneme sequences after, say, the integration of quantitative ablaut, in view both of attested developments in the IE languages and of assumed prior stages of IE. Both Sievers-Edgerton and the reduced vowel theory make such a claim about the phonetic implementation of the feature of syllabicity in IE, although the reduced vowel theory makes by far the weaker claim in this respect, since it asserts nothing more than that an anaptyctic vowel, similar in nature to the French *e muet*, is found in certain stateable environments. In other words, the inherent sonority feature of the semivowels is never at stake, since they maintain their consonantal function under all conditions, the syllabic function taken over by the anaptyctic vowel.

The difficulty of such a view is seen in the proposal of Collinge, wherein any consonant is said to have a potential vocalic function by virtue of its exuding an anaptyctic vowel under stateable conditions.²⁸ But this assertion does away with the autonomous role of phonological patterning, in which certain classes of phonemes behave according to their typological, or inherent nature, and this is precisely the issue with the IE sonants and especially the laryngeals. The Sievers-Edgerton claim is that the IE sonants appear in the syllabic portion of the syllable by virtue of their inherent degree of sonority. That such phonemes — *r l m n y w* — belong to that set of IE phonemes which has the requisite sonority to function both as syllabic and non-syllabic is precisely the phonological feature which characterize these phonemes. Only the most stubborn opponents of Brugmann's and Osthoff's original demonstration of these facts sought to criticize the inherent feature which characterizes the IE sonants.²⁹ Thus Bechtel's claim that "das Ergebnis der bisher über die Entwicklung der Schwächung angestellten Untersuchungen ist, dass eine durchaus gleichmässige Behandlung der Verbindungen *ei, eu* und *em, en, er, el* nicht besteht"³⁰ is supported from Sievers: "Eine gewisse praktische Berechtigung hat allerdings die Abtrennung dieser Verbindungen von den vocalischen Diphthongen, weil die Liquidae und Nasale ihrer Articulation und ihrem Klänge nach von den Vocalen allerdings so weit abstehen, dass sie mit denselben für unsere Empfindung nicht zu einer so homogenen Lautmassen zusammenschmelzen, als das bei reinen Vocalverbindungen möglich ist".³¹ There can be

²⁸ "Laryngeals in Indo-European ablaut and problems of the zero grade", *Archivum linguisticum* 5.75-87 (1953).

²⁹ See, for example, F. Bechtel, *Die Hauptprobleme der indo-germanischen Lautlehre* (Göttingen, 1892), pp. 114-153; also J. Schmidt, *Die Pluralbildungen der indogermanischen Neutra* (Weimar, 1889), p. 218.

³⁰ *Op. cit.*, p. 152.

³¹ E. Sievers, *Grundzüge der Phonetik*, fourth edition (Leipzig, 1893), p. 154; cf. also Mehringer, *Zeitschrift der österreichischen Gymnasien* (1888), p. 138 fn.

little doubt, however, of the unacceptability of such early phonetic researchers. *r l m n* are completely analogous to the vocoids by virtue of their distinctly predominant formant structure, although the presence of significant zeros in their spectrum places them simultaneously with the contoid phonemes. Not even Hirt, one of the staunchest supporters of the shwa secundum theory, doubted for a minute the similarity of *r l m n* to *y w*.³² Edgerton has afforded ample proof, although consistently demonstrable only from the Veda, that it cannot be a question of a reduced vowel in the environment of the semivowels, and the so-called "converse of Sievers's law", by which a syllabic sonant is lost before an homogeneous non-syllabic sonant when the two occur at morpheme juncture, after a light syllable, again understandably demonstrable only in the Veda, is valuable support of his notation *-r̥r-*, etc., after a heavy syllable and before a vowel as the conditioned variant of *r*, etc.³³ Thus the reduplicated third plural perfect [**ké-kr̥-ra*] is *cakré* in Sanskrit, not **cakire* < [**cak̥r̥re*], with **-r̥r-* reduced to *-r-* before a light syllable here.³⁴ Once it is admitted, finally, that the IE sonants functioned both syllabically and non-syllabically by virtue of their special sonority feature, discussion as to how much of the stretch of sound subsumed under the three conditioned variants of the sonants is realized as sonant alone or sonant together with some more centralized neutral vowel is not only pointless, since it can probably never be answered, but irrelevant, since such a contrast between complete syllabicity of the sonants and insertion of an automatic vowel could hardly have existed at the same time in IE. Kuryłowicz, who has most recently given up many of his earlier phonetic assumptions concerning the implementation of the laryngeals in the zero grade, has warned against this kind of speculation: "Rien n'empêche de poser *ḍatós* phonétique = *d̥ḥtós* phonologique, tout comme *kr̥tós* phonétique = *krtós* phonologique. (§12). Ce qui importe, c'est de ne pas poser un stade phonologique *ḍatós* entre *d̥ḥtós* et les reflets historiques Si nous continuons à nous servir des symboles *ə* ou *m* (dans *statós*, *k̥ṛtóm*) à la place de *ə* ou *m*, qu'exigerait une transcription phonologique rigoureusement appliquée, il ne s'agit là que d'une concession faite à la transcription traditionnelle, qui note ici la variante combinatoire (*ə*, *m̥*) à la place du phonème (*ə*, *m*). Du reste, l'entourage de ces variantes étant strictement déterminée (*ə*, *m*: entre deux consonnes, entre consonne et zéro, entre zéro et consonne), aucun malentendu n'est à craindre".³⁵

5.24. The question to be asked concerning the laryngeals between non-syllabics is whether they behaved like the IE sonants (i.e., belonged to the class of phonemes

³² Hirt, *Der indogermanische Ablaut* (Strassburg, 1900), p. 8.

³³ Edgerton, *op. cit.* (1934), pp. 237-241; *op. cit.* (1943), pp. 87-90.

³⁴ Güntert, for example, insists on Skt. *cak̥r̥re* as the original form and points to A. J. Schmidt as having shown that Indo-European **-r̥r-* becomes Skt. *-r̥r-*, as well as *-ir-*. But the conditions which Güntert gives are totally ad hoc: "Im Medium schwand das *ə* (i.e., *ə*) im dem Endungscomplex *-əre* nur bei vorausgehenden einfachen Konsonanten, sonst bleib es; allein die Färbung des *r̥* (*r̥*) übertrag sich auch hier dem benachbarten irrationalen Vokal; so wurde aus **cak̥r̥t̥-əre* das historische *cak̥r̥re*" (*Op. cit.*, p. 96).

³⁵ *Op. cit.* (1956), p. 170.

r l m n y w by virtue of the same kind of relative sonority feature which distinguished the sonants from the other IE consonants), and this question cannot be answered by choosing or not choosing to use a reduced vowel in their environment. That is, one cannot avoid the issue by *a priori* putting them with the IE true consonants (and thereby using a reduced vowel), since this is precisely what we want to find out. In addition to the distributional evidence of the laryngeals in IE root structure and the ablaut parallelism between the IE sonants and the laryngeal phonemes that have been discussed (§5.0-5.1), the IE reflexes of sequences of sonants, including the laryngeals, provides additional evidence for insisting on the phonological character of the laryngeals as *coefficients sonantiques*. With such evidence must be included the conditioning factors which produce alternations involving the syllabic or non-syllabic reflex of the laryngeals — a preceding light vs. heavy syllable and a following vowel or consonant — precisely the conditions underlying Edgerton's description of the allophones of the IE sonants. The most conclusive evidence of this kind has been provided by Kuryłowicz³⁶ and by Brosman,³⁷ although the sonant-like features of the laryngeals occurring after sonants have been noticed much earlier, although isolatedly. Thus the Skt. root *krī-* 'buys', Skt. *krīṇāti*, *krītāh*, Greek *πρίαμαι* (although the history of this word is still not clearly elucidated) shows perhaps in the first case the non-syllabic, in the second the syllabic implementation of the laryngeal: *krītāh* < **k^wri-Ḥtós*, but *πρίαμαι* < **k^wriyḤ-(mai)*. The reflex *-ια-* in Greek represents the normal development of two sonants after a heavy syllable and before a consonant and is thus conformable to the pattern *etiyut/ktiyut* (if the initial *r* of the sequence of three sonants is non-syllabic, as one should expect, although Edgerton did not work out all the possibilities involving three sonants); the *ī* reflex in Skt. *krītāh* would come from an IE **k^wriḤtós*, rather than from **k^wryḤtós*, and therefore represents the development after a light syllable. The correspondence Skt. *pātnī*, Greek *πόντια* is thus explained in the same way. To these isolated lexical examples can be added, with Brosman, the *ī/yā* stems, which show Skt. *ī* but Gk. *ια* from **i(y)a*: Skt. *bhārantī*, Gk. *φέρουσα* < **φέρωντι-(γ)α*.³⁸ What is important to remember in these examples, and in those that follow concerning sequences of sonants involving laryngeals, is that if the laryngeals were true consonants, and therefore incapable of autonomous syllabic implementation in the manner of the other sonants, then the laryngeal as second member of such sequences should not leave contrasting reflexes of syllabic and non-syllabic implementation. Indeed, reconstructing the two alternations with a reduced vowel before the laryngeal in one case and not the other (say **_əyə* for the *ī* reflex, but perhaps **iy_ə* for the second — Hirt contents himself with **_əyə* for both, and confesses that the reflex in Gk. *πρίαμαι* is "*unverständlich*"³⁹) is only to admit that the laryngeal is implemented

³⁶ Kuryłowicz, *op. cit.* (1956), pp. 195-208.

³⁷ P. W. Brosman Jr., "Proto-Indo-Hittite *ə* and the allophones of the laryngeals", *Language* 33.1-18 (1957).

³⁸ Brosman, *op. cit.*, pp. 9-10.

³⁹ *Op. cit.*, p. 139.

syllabically in one rather than another environment, which should still not be the case if the laryngeals were true consonants in those environments.⁴⁰

Among the many additional examples that Brosman provides as evidence that the laryngeals behaved like the IE sonants in terms of the Sievers-Edgerton description of these phonemes, the triple reflex of the long syllabic sonants in Greek is the most revealing, since it also figures in Kuryłowicz's treatment of the same question. Brosman considers the Greek doublets θάνατος/θνητός to be the reflexes of the normal Edgerton conditioned variants of two sonants between consonants, the first after a heavy syllable — θάνατος < *dhynHtós, i.e., conformable to [k^htiyHt], the second after a light syllable — θνητός < *dhnHtós, i.e., conformable to [tyHt] > [tīt]. The variant usually found in compounds and after a reduplicated syllable, e.g. Brosman therefore considers analogically based on the model φημα/φέμιν. Brosman's proposed development of *-nH- to -vā- seems ad hoc phonologically, however — one ought to expect -vā- — and his isolated description of such forms is not as convincing nor as morphologically integrated as Kuryłowicz's treatment.⁴¹ For Kuryłowicz *TRə-tó-* (in this case *R* is the nasal sonant) > *Trā-tó* is the normal development (after a heavy syllable), *TRā* the reflex after a light syllable. Thus for *Trā-* Kuryłowicz states that "Après la voyelle (brève) du redoublement ou du premier membre de composé *TRə-tó* se transforme en *TRə-tó*, d'où *TRA-tó-* dans les langues méridionales".⁴² This is of course tantamount to saying that after a light syllable the *R* becomes non-syllabic (Kuryłowicz always begins with -*Rə-* since he considers the sonant more likely to be some syllabic than the laryngeal) and the laryngeal syllabic, which is precisely what we should expect from Edgerton in the development [tyHt] > *nā-*. The development of the normal long syllabic sonant *TRā* is less clear as a phonological development in Kuryłowicz, but nonetheless gains in importance as it is but one example of his highly productive development *TeRi*, *TeRy* to *Trī*, *TRū* in the zero grade. He assumes the phonetic stages for the former to be *TRə* > *Trā* (*TaRəa*) > *TRā* (or *TaRā-tó*), and therefore phonologically parallel to the development *ToRu-tó* > *Trū-tó*, although, after stating that "Si en grec et en italo-celtique le degré zéro correspondant à *TeRā* (*ā* < *ə*) est *TRā*, il a pu se produire en indo-européen, donc à une époque plus reculée, une réduction de *TeRi*, *TeRy* à *Trī*, *TRū*",⁴³ he adds as support to the development

⁴⁰ Cf. Brosman, *op. cit.*, p. 10: "(These explanations of the Greek doublets *thánatos/thnētós* and their parallels) and of Gk. *-ia* beside Skt. *-ī* are possible only if we assume the laryngeals to have been sonants. If the laryngeals were consonants, we would have only in these cases ... a single sonant between consonants, for which there is only one positional variant, the vocalic. Out of this form there is no way to get two developments."

⁴¹ The only possible parallels in the preceding discussion concerning the sonantal character of the laryngeals as second member of such sequences which some sort of reduced vowel theory has attempted to explain are, e.g., doublets of the type Gk. *κραδίᾱ*, *καρδίη*, where *ap/ra* is explained either as (1) **k_ərd-/kr_əd-*, depending on the preceding light vs. heavy syllable (cf. Hoeningswald, *op. cit.*), or as (2) **k_ərd-/kr_əd-* (see Hirt, *op. cit.*, p. 92). But the alternations, even when reconstructed with the help of reduced vowels, can have nothing to do with a syllabic implementation of any true consonant following **r* in such forms.

⁴² *Op. cit.*, p. 197.

⁴³ *Op. cit.*, p. 143.

of *TeRə* > *TRā* the similar development of *TeRi*, *TeRu* > *TRī*, *TRū*. Nevertheless Kuryłowicz admits that the development of *TeHi*, *TeHu* > *Tāi*, *Tāū* > *Tī*, *Tū*, — e.g., **dheHi-* ‘nourish’, Skt. *dhāyaḥ* ‘nourishing’, beside the zero grade *dhītāḥ* ‘sucked’ < **dhHi-*; **peHu-r* ‘fire’, Hitt. *pahhur* beside Gk. *πῦρ* < **pHu-r* — with loss of the laryngeals before a syllabic, is entirely parallel to the other long syllabic sonants: “Il suffit, pour l’expliquer, d’admettre que *ə* fonctionne ici comme une sonante *R*”.⁴⁴ In fact, Kuryłowicz’s whole discussion of sequences of sonants shows the obvious advantages of considering the laryngeals as phonologically part of the class of IE sonants.

A final example that must be mentioned and which is also included in Brosman’s paper is the much abused Skt. verbs *dhā-* and *dā* which show the absence of shwa primum in the reduplicated present — *dadhmāḥ*, *dadmāḥ*, but not in the perfect — *dadhimā*, *dadimā* — verbs upon which so many theories of weak grade vocalism are constructed. Brosman’s solution is that the internal sequences of phonemes in the first person plural vs. the second person plural provide the conditioning factors for the *-i/-ə-* variation. Thus **[dhidhHiṃmés]*, after the loss of the laryngeal regularly before a syllabic, and the subsequent loss of *ṃ* after a light syllable — i.e., the converse of Sievers’s law — becomes *dadhmāḥ*, the allophonic sequence of sonants which is regular after a single consonant and before a vowel; but the second person plural **[dhidhHi(h)é]* > **dadhithá*, with both possible generalizations — *dadhmāḥ*, *dhattá* in Skt. and τίθεμεν, τίθετε in Greek. Here the regular conditioned variants of two sonants after a single consonant and before a vowel, and interconsonantly, readily permit the explanation of these forms.⁴⁵

5.3. The final synchronic feature of IE phonology with regard to the laryngeals that can now be made the basis for delimiting the nature of these phonemes is that they belonged to the IE class of sonants, that class of phonemes which must be defined as having the requisite relative degree of sonority to function both as syllabics and as non-syllabics. If some distinctive feature description of the IE laryngeals is to be entirely adequate, it must certainly include this feature of syllabicity, and not simply in a notational or *ad hoc* manner. What we really inquire now is whether the particular values that we have ascribed to the IE laryngeal consonants have the requisite inherent sonority to qualify them to function as syllabics and non-syllabics.

It is the particular nature of the IE laryngeals as I have described them — *h* + tense, + flat; *ḡ* — tense, + flat; *h* — flat, and hence the last with the tense/lax opposition only redundant and therefore theoretically capable of *h* or *ʔ* implementation depending on environment — that they can be thus implemented both syllabically and non-syllabically. This inherent possibility is due to the complete separation of sub-oral voice quality articulation (pharyngealization, tenseness, laxness) and oral resonance. In this way, either the noise source (pharyngealization, etc.) or the resonance source

⁴⁴ *Op. cit.*, p. 125.

⁴⁵ See Brosman, *op. cit.*, pp. 14-18.

(oral cavity resonance) can be to a large degree autonomously emphasized. As consonantal phonemes, the noise source or voice quality, which is never true voicing, even for ʕ, becomes the primary distinctive feature in terms of relative sonority, so that the simultaneous oral resonance is more akin to a whispered vowel, but to a large degree attenuated by the sub-oral noise source, although the different inherent formant positions of *h* and ʕ show up clearly enough on spectrograms. The primary noise source is implemented in the acoustic (and hence perceptual) cues by the distortion effects of the adjoining vowels, which in turn are discernible, as we have discussed, as the shift in vowel formant structure of the adjacent vowels. It is noteworthy that in those dialect areas of greatest retraction, ʕ is always more retracted than *h*. This property of ʕ we have already associated with greater backing and pharyngealization and simultaneous higher larynx position.

The resonance source, or oral cavity resonance, can be autonomously emphasized by substituting the voice quality of true laryngeal voicing for glottal friction and/or tenseness, so that the laryngeals in their syllabic implementation are then PHARYNGEALIZED VOCOIDS:, rather than pharyngealized laryngeal fricatives, as in their non-syllabic implementation. This dual implementation is not as possible for \mathcal{H}_1 (or *h/p*), so that it is probably advisable to assume a neutralization of the three-way laryngeal distinction as consonants, and to assume a single voiced pharyngealized vocoid for shwa primum. It should be pointed out that only a complete separation of sub-oral noise and supra-glottal resonance as simultaneous components will insure both syllabic and non-syllabic implementations as far as the IE laryngeals are concerned. Although the laryngeal sounds *h* and ʕ function as purely consonantal phonemes in Arabic (or at least so they have been described), the potentially dual aspect of these sounds has been appreciated in the more astute Arabic phonological writings, and confirms the description which I have assumed for the IE laryngeals. Thus Gairdner, in describing the method that English students should follow in order to properly articulate the Arabic *h*, advises that "All the student has to do is to put his mouth into the position of one of the opener vowels, preferably the sound as in *saw*, and whisper this vowel as strongly as he can".⁴⁶ His remarks concerning Arabic ʕ, although more impressionistically and orthographically confused, are equally instructive concerning the inherent vocoid characteristics of ʕ and its greater retraction: "In Egyptian colloquial ʕ appears to modify both a preceding and following *a*-vowel to *a*. The sound aimed at is, however, the normal Arabic *a*; the impression of *a* is caused by the *a*-quality inherent in the consonant ʕ".⁴⁷ Vergote has described the articulation of ʕ, as far as it differs from *h*, thus: "Les cordes vocales sont si fortement serrées les unes contre les autres que l'air ne parvient à se frayer un passage que par une pression

⁴⁶ W. H. T. Gairdner, *Phonetics of Arabic* (Oxford, 1925), p. 27. See also Robert E. Maston's *Lebanese Spoken Arabic* (Beirut, 1956), volume 1A, Lessons 8 and 11, where *h* and ʕ are described as voiceless and voiced pharyngealized vocoids, and where the pronunciation drill is based on the pharyngealization of low mid and low back vocoids respectively.

⁴⁷ *Op. cit.*, p. 48.

forcée; il met les cordes vocales en vibration mais celles-ci se referment en une série de petites occlusions rapides. Le *ṣayin* est donc comme une voyelle, notamment *a*, mais articulée avec un effort particulier, avec une voix forcée".⁴⁸ Mattsson is generally in agreement with Vergote here: "C'est bien notre impression que pendant l'articulation l'air se fraye un passage malgré une forte résistance, et que, par ce fait, il se produit une série de petites explosions, qui se confondent et font percevoir à l'oreille comme une fricative vocalique".⁴⁹ And further: "Ainsi qu'on est amené de se rendre compte par ce qui précède, on peut interpréter *ṣ* comme une voyelle forcée".⁵⁰ Since *ṣ* is more nearly voiced than *ḥ*, it is not difficult to understand how the simultaneous vocoidal character of *ṣ* has been appreciated more than it has for *ḥ*. Thus Mattsson has provided some interesting cases of the possible syllabic nature of *ṣ*, and especially in relation to neighboring liquids and other consonants: "Autant que nous nous y connaissons, les liquides sont syllabiques avant *ṣ* au commencement d'un mot, par ex. *ṣṣest* 'j'eus sommeil', tandis qu'il semble que *ṣ* lui-même forme syllabe, bien qu'il soit suivi d'une voyelle, dans le cas où des consonnes moins sonores précèdent, par ex. *tṣallam* 'il apprit' À la fin d'un mot, ou à l'intérieur avant une autre consonne, *ṣ* forme syllabe, quelle que soit la consonne qui précède, par ex. *sabṣ* 'sept', *ṣamṣ* 'sing'. Si *ṣ* précède, il forme toujours syllabe au commencement d'un mot ..., par ex. *ṣṣtaraf* 'il se confessa'".⁵¹

This contoid/vocoid alternation which underlies the IE laryngeals accords well with similar phonological situations observed in spoken languages other than Arabic. J. Carnochan has described for Hausa a similar situation, which he calls *h*-prosody following the Firthian school of phonology. This so-called *h*-prosody can have both

⁴⁸ J. Vergote, *Phonétique historique de l'égyptien* (Louvain, 1945), pp. 72-73.

⁴⁹ E. Mattsson, *Études phonologiques sur le dialecte arabe de Beyrouth* (Uppsala, 1911), p. 45.

⁵⁰ *Op. cit.*, p. 47.

⁵¹ *Op. cit.*, pp. 100-101. Although there is little evidence additionally that one can uncover in traditional Arabic phonological studies on the vocoidal or syllabic nature of *ḥ* and *ṣ*, the nature of the Hebrew *patākh furtivum* (cf. Chapter 2, fn. 34) can now be better integrated into the nature of the Semitic laryngeals. We have described this as a kind of anaptyctic vowel that appears under stated conditions in Hebrew, i.e. before the so-called weak consonants, and is usually a low mid or low back rounded vocoid. Although the evidence is not clear, the first usually occurs before *ḥ*, the second before *ṣ*, although vowel harmony may have something to do with the conditioning as well. The important point here is that this phenomenon is not peculiar to Hebrew, among the Semitic languages, but is a widespread Arabic feature as well, where *patākh furtivum* generally occurs before *ḥ* and *ṣ*, although it appears to be better documented in Hebrew than in Arabic. (But see W. Marçais, "Le dialecte arabe des Ūlād Brāhim de Saïda", *Mémoires de la Société de Linguistique de Paris* 14.97-164 [1906], 162-163). This phenomenon is described as well for Somali (see J. Pia, *An Outline of the Structure of Somali* [University of California, 1963], p. 23), and there is thus good reason to believe that it is phonetically associated typologically with the Semitic laryngeal sounds. This is certainly understandable, since the glide or anaptyctic vowel is simply that part of the pharyngealized vocoid after the pharyngealization has ceased, before a following consonant. Thus Vergote astutely comments that "Le mouvement de la racine de la langue explique pourquoi le phonème (i.e. *ḥ*) s'accomode le mieux avec un [d] postérieur et pourquoi il développe en hébreu le *patākh furtivum* ..." (*op. cit.*, p. 72). This statement most likely is true for most, perhaps all, of the Semitic languages which have retained the laryngeals, and in a general phonetic sense adds to the evidence for characterizing these sounds as inherently both vocoidal and contoidal.

syllabic and non-syllabic implementations. "Its implications in the C position are short duration and lax articulation, and in the C position, voicelessness".⁵² Several modern Indian languages, Hindustani and Panjabi, show the close parallel between laryngeals as autonomous consonantal phonemes, and as vowel-like phonemes implemented by the prosodic feature of length and of vowel quality alone. In Hindustani "... *pəhyle* ... (is) ... a three syllable word in which *h* is phonematic (CV-CVCV). In *pəyle* there are two syllables by a sort of coalescence in which *əyh* indicates an open 'h'-colored or breathy vowel of the *ə*-type (CVhCV)".⁵³

As a final phonological parallel to the nature of the IE laryngeals proposed here, the situation in modern Maltese, unfortunately ignored to a large extent by Arabists, provides, both diachronically and synchronically, a striking parallel to the state of affairs in the IE languages. Aquilina, who has provided the most comprehensive modern investigation of the structure of Maltese, describes the vowel system as consisting of a five vowel pattern *a e i o u* with phonemic opposition of length and in addition, a series of pharyngealized vowels, predictably long, as well as a series of weak pharyngealized vowels.⁵⁴ The description of the pharyngealized series in Maltese accords well with the kind of pharyngealized vocoids which we have discussed. The actual dialectal representatives of this series, however, are extremely rare in the case of the pharyngealized vowels *i* and *u*, less rare for pharyngealized *e* and *o*, and extremely common for the compact vowel *a* in all dialects. Aquilina transcribes these as *γa*, *αγ*, *γe*, *εγ*, etc., but, as Cowan has pointed out, this is merely an orthographic decision, since "the fully pharyngealized vowels result(ing) from earlier /V9, 9V, Vγ, γV/".⁵⁵ Since Arabists are generally in agreement on the coalescence of Proto-Semitic *γ* and *ʕ* to *ʕ* in Maltese,⁵⁶ the pharyngeal vowel series is certainly the result of the phonemicization of the vowel distortion effects caused by *ʕ* after the loss of this phoneme. Cowan is less sure of the existence of Aquilina's weak pharyngealized series, which the latter transcribes as *ha*, *ah*, etc., and it may be the case that Aquilina has phonemicized vowels preceded and followed by glottal friction as unit weak pharyngealized vowels. In any case, the extraordinary parallel involving the actual phonemicization of earlier predictable vowel distortion effects of laryngeal sounds in Maltese is certainly the closest phonological parallel to the situation which I have argued for IE, and fully corroborates this causal or inherent nature of the laryngeal sounds.

⁵² J. Carnochan, "Glottalization in Hausa", *Transactions of the Philological Society* (1952), 78-109, p. 97.

⁵³ J. R. Firth, "Sounds and prosodies", *Transactions of the Philological Society* (1948), 127-152, p. 148.

⁵⁴ J. Aquilina, *The Structure of Maltese* (Malta, 1959), pp. 7, 18-19.

⁵⁵ W. Cowan, *Review of Aquilina, op. cit.*, *Language* 36.179-184 (1960), 182.

⁵⁶ See e.g. C. Brockelmann, *Grundriss der vergleichenden Grammatik der semitischen Sprachen I* (Berlin, 1908), p. 121.

CONCLUSION

6.0. The theory of the phonological nature of the IE laryngeals that has been argued here would appear to have as much in common with the earlier theories concerned with this question, those usually based on some notion of phonetic realism, as it does with componential analysis based upon a set of reflexes in the various IE languages, or based on the synchronic role of the laryngeals in PIE phonology. This is true only to the extent that I have tried to take the most delimitative and unique aspect of the laryngeals — their allophonic influence on adjoining vowels and their dual patterning as vowel and consonant phonemes, i.e. their *coefficient sonantique* nature — as the basis for arriving at the system which I have presented. The phonetic inventory of facts from the Semitic languages has been used only typologically in order to fit the behavior of the IE laryngeals into a system of distinctive feature complexes for which certain Semitic languages show demonstrable phonological characteristics. Actual phonological systems can thus be put beside phonological theorizing as parallel examples, provided the similarities are typologically, not accidentally related. It is not necessary, however, at the same time to include some explanation in terms of some convincing structural pressure whose effects appear to be either dictated by other features of the code, or at least conformable to a general evolutionary tendency of which the particular language is but one stage. The latter is, of course, difficult in the case of a reconstructed language, since all of the direct evidence concerns later stages of the language. The only structural pressure which could be adduced would be reasons for precisely the particular effects of the laryngeals, and no matter how they might be typologically interpreted they would remain *post facta* in any case. Nonetheless the facts to which the IE laryngeals described here must conform are surely the reflexes attributed to the laryngeals.

6.1. The question that must be asked as far as the reflexes of the laryngeals in the IE languages are concerned is whether their phonological nature can be integrated with these later reflexes without necessitating any arbitrary hypotheses to make this possible, i.e. whether these reflexes can be adequately and naturally deduced from the IE laryngeal system as presented here. Such independent confirmation is methodologically crucial but it has not formed a part of other phonological descriptions of the laryngeals

since either these reflexes themselves have been used inductively to arrive at the phonological nature of the laryngeals, or have been invoked either partially, or not at all.¹

6.11. The lengthening feature of the laryngeals when following syllabic phonemes has been emphasized by Couvreur² and Messing³ as a typological characteristic of the Semitic laryngeals *ʔ* *h* and *h*, i.e. nearly universally attested in Semitic and associated with the loss of these phonemes in precisely the same syllabic conditions as the IE laryngeals, and it is therefore hardly necessary to repeat this fact.⁴ Lehmann, however, concludes that such compensatory lengthening is necessarily the result of continuant articulation,⁵ but this by itself is not warranted. It is true that typologically continuant sounds tend to be less stable diachronically than stops, and hence are oftener the cause of compensatory lengthening than the latter, but if the laryngeals should turn out to be stop consonants, there is no reason to assume that such phonemes could not cause compensatory lengthening. The point is that compensatory lengthening alone is not delimitative enough as a diachronic process. It is clear, in any event, that the IE laryngeals as described here are typologically associated with compensatory lengthening, since they represent the most complex sounds in a universal phonological hierarchy, i.e., they are the maximal attenuation of the contrast vocoid/contoid, and this inherent feature explains the numerous historical examples of the loss of these phonemes with compensatory lengthening. The Arabic dialects are an unusual situation in Semitic, and the stability of these sounds is certainly connected with the simultaneous role of secondary emphasis (i.e. pharyngealization) in these dialects.

6.12. De Saussure's original hypothesis that the Indo-Iranian voiceless aspirates arose from sequences of voiceless stops followed by a laryngeal (more precisely the

¹ E.g. the system of laryngeals presented by Puhvel (cf. §1.6, 2.33) and which he finds justified in terms of certain morphological insights which he deduced, might also be judged on the basis of how well it could be said to cause such reflexes as Indo-Iranian aspiration of preceding voiceless stops, the initial series of voiceless resonants in Pre-Greek, or whether such a system could also subsume the status of both vowel and consonant phonemes, and so on. But it is clear that they hardly fit such phonological facts. Messing ("Selected studies in Indo-European phonology", *Harvard studies in classical phonology* 56-57.161-232 (Cambridge, Mass.), 223-232) considers the lengthening power and vowel-coloring effect of the laryngeals, but hardly integrates the Pre-Greek evidence, and excludes Indo-Iranian aspiration, from consideration. Kuryłowicz includes the supposed voicing of *h*₃ and Indo-Iranian aspiration, as well as the coloring power of the laryngeals, but his componential description — "qui aspire les occlusives", "qui n'aspire pas les occlusives" etc. — are too disembodied phonologically and the result is certainly not a set of phonemes described according to any normal synchronic practice. (*Études indoeuropéennes I* (Cracow, 1935), p. 254). It is important not to select arbitrarily or conveniently what is going to be used as the inductive evidence in such cases.

² W. Couvreur, *De hettitische h* (Louvain, 1937), pp. 270-275.

³ *Op. cit.*, p. 228.

⁴ The evidence for Assyro-Babylonian, i.e. East Semitic, is summarized in I. J. Gelb, *Old Akkadian writing and grammar, second edition* (Chicago, 1961), pp. 119-127, and for Semitic in general, C. Brockelmann, *Grundriss der vergleichenden Grammatik der semitischen Sprachen I, Laut- und Formenlehre* (Berlin, 1908), pp. 47-50.

⁵ W. Lehmann, *Proto-Indo-European phonology* (Austin, 1952), pp. 105-106.

laryngeal associated with a -color, i.e. H_2 , for which see Chapter 1, fn. 80) was proposed without indicating any phonetic suitability that the laryngeals might have for this, but only as an indication of cognate relationship: "... ici $th = t$ [i.e. in Sanskrit $pt̪h̥$, Greek $\pi\lambda\alpha\tau\acute{o}\varsigma$] aurait une valeur étymologique".⁶ Kuryłowicz, although he used the Indo-Iranian voiceless aspirates as a means of indicating one of the componential features of the laryngeals, says only that ϑ_4 (really ϑ_2) is $+$ with regard to aspirating a preceding voiceless stop, ϑ_2 — with regard to aspirating a preceding voiceless stop,⁷ but these can hardly be considered phonological components or distinctive features, since they are merely a statement of the reflex of the laryngeals, and this is not the same thing as to identify them for the period before this change came about. Lehmann was the first to relate Indo-Iranian aspiration to the problem of the distinctive features of the laryngeals (in this case H_2 although he subscribes to Kuryłowicz's distinction of two a -colored laryngeals). He states that "The chief allophone of $/h/$ may be most readily determined from its reflexes in Sanskrit; $/p\ t\ k/$ plus $/h/$ became Skt. $/ph\ th\ kh/$. Since these reflexes fell together with unvoiced reflexes of PIE $/b^h\ d^h\ g^h/$, the reflex of $/h/$ must have been similar to the unvoiced aspiration of these phonemes. I conclude that the chief allophone of $/h/$ was $[h]$; the friction was presumably produced in the larynx, but it may also have been produced in the pharynx".⁸ Lehmann's reasoning is certainly correct, but it is concerned only with one particular reflex in Indo-Iranian, and his distinction between $/x/ = [x] (=H_4)$ and $/h/ = [h] (=H_4)$ is not proven for the IE laryngeals.

The description of the laryngeals as $H_1 = -$ flat (and redundant with respect to tenseness/laxness) $H_2 = +$ flat, $+$ tense, $H_3 = +$ flat, $-$ tense (cf. §4.4) readily accommodates the Indo-Iranian reflexes ascribed to them. It is safe to assume, depending on the particular IE dialect, either partial or complete falling together of the IE laryngeals before their total disappearance from the IE languages, and after the contrast flat/plain (or after the vowel-coloring effects) had become established as part of the IE vowel system.⁹ For Indo-Iranian one can postulate a merging of H_1/H_3 vs. H_2 , i.e. a distinction between the original (marked) tense laryngeal (H_2) and the remaining laryngeals, since only the former produces the Indo-Iranian voiceless aspirates. Now in terms of the physiological and acoustic features underlying H_2 (vs. H_3), once the flat (vs. plain) distinction ceased to be operative for the laryngeals, i.e. the particular pharyngealization associated with these phonemes, H_2 would be simply a laryngeal spirant, since the tenseness of H_2 was at least partially laryngeal aspiration (with concomitant flatness for the earlier stage of IE). Sequences of voiceless stop and the reflexes of H_2 in Indo-Iranian would correspond phonetically to the reflexes of the IE voiced aspirates following s , which sets of reflexes made up the Indo-Iranian voiceless aspirate

⁶ *Recueil des publications scientifiques* (Carl Winter, Heidelberg, 1922), p. 603.

⁷ *Op. cit.*, p. 254.

⁸ *Op. cit.*, p. 108; see also Kuryłowicz, *op. cit.*, pp. 50-54.

⁹ Both Couvreur, *op. cit.*, pp. 270-275, and Messing, *op. cit.*, p. 228, have stressed this property of the laryngeals and the parallels to the Semitic laryngeals in this case.

phonemes. There are, therefore, no additional hypotheses necessary to explain the development of these phonemes in Indo-Iranian, since their development is explainable entirely in terms of the original IE laryngeals outlined in Chapters 4 and 5. Kuryłowicz was the first to propose the development of IE $*b *d *g *g + \bar{H} >$ Indo-Iranian $bh dh gh gh$, but $> b d g g$ in the other IE languages. There are, however, an extremely limited number of such examples, and of the four which Kuryłowicz proposed, he identifies the laryngeal as \bar{H}_2 for the first two — Skt. *māhi*, Gk. *μέγας*, Goth. *mikils*; Skt. *duhitā*, Gk. *θυγάτηρ* — but finds no evidence for specifying the laryngeal for the remainder.¹⁰ The explanation of the Indo-Iranian voiced aspirates arising from sequences of voiced stop and laryngeal is precisely the same as for the genesis of the voiceless aspirates, since the laryngeal responsible for these limited examples is probably \bar{H}_2 . Kuryłowicz also pointed to the voiced character of \bar{H}_3 from the IE root $*pe\bar{H}_3$ ‘drink’, where e.g. Skt. *pibati* $< *p\bar{t}-p\bar{H}-e-ti$, with b in Sanskrit originating in thematic verb forms where $*p$ was contiguous to the laryngeal.¹¹ As has been noted in this context, the total lack of any other evidence for distinctive voicing for \bar{H}_3 except this one example involves a good deal of uncertainty about distinctive voicing for \bar{H}_3 and in terms of the distinctive features of the laryngeals as described here, one ought not to find the unmarked $\bar{?}$ (with respect to laxness) responsible for causing contiguous voicing.¹²

6.13. The claim that three of the IE laryngeals¹³ must be reconstructed with distinctive voicelessness is based on certain developments of initial sequences of laryngeals plus resonants in Greek which Sapir¹⁴ and Austin¹⁵ formulated.¹⁶ The three laryngeals that make up this suggestion are Sapir’s $\rho, \bar{\rho}, x$, i.e. the IE e -colored and two a -colored laryngeals, regardless of the value that these scholars attach to γ . The evidence has already been discussed, but is based on the acceptable hypothesis that Pre-Greek had a series of initial voiced resonants contrasting with a series of resonants that are partly attested as rough breathing of the following vowel (i.e. as spiritus asper). This second

¹⁰ Kuryłowicz, *op. cit.*, p. 53.

¹¹ *Ibid.* Cf. §2.31.

¹² Cf. C. Watkins, “Componential analysis of laryngeals”, *Evidence for laryngeals* 232-238, Werner Winter, editor (University of Texas, 1960), pp. 236-237; W. Cowgill, “Evidence for laryngeals in Greek”, *Evidence for laryngeals* 93-162, Werner Winter, editor (University of Texas, 1960), pp. 140-141. Puhvel, on the other hand, has stated that “... there are indications of distinctive voice word-initially in both of the latter (i.e. his A_1 and A_1^*) IE laryngeal categories.” (“Hittite evidence for Indo-European laryngeals”, *Evidence for laryngeals* 163-172, Werner Winter, editor [University of Texas], 1960, p. 170). But the evidence is not yet in print, so that it remains to be seen whether his A_1 and A_1^* , the first supposedly lost in all positions both in Hittite and the other IE languages, the second probably lost under the same conditions, show any trace of distinctive voicing.

¹³ This claim should be emended, at least for those who do not subscribe to two a -colored laryngeals, since both are said to cause aspiration of a following resonant in Pre-Greek, to only two laryngeals, i.e. \bar{H}_1 and \bar{H}_2 .

¹⁴ See his “Glottalized continuants in Navaho, Nootka, and Kwakiutl”, *Language* 14.248-274, (1938), esp. pp. 269-274.

¹⁵ See his “The prothetic vowel in Greek”, *Language* 17.83-92 (1941).

¹⁶ Cf. §2.323.

series has been shown to come from older sequences of laryngeal plus resonant, the laryngeal sometimes additionally developing to a prothetic vowel in the case of *w, and subsequent loss of digamma. Etymological evidence supports the view that the IE *e*-colored and *a*-colored laryngeals participated in this development (but not Sapir's *ʔ*, since I do not accept a second IE *a*-colored laryngeal). Sapir claimed that "By *w* is meant a *w* which had absorbed the preceding aspiration, therefore probably a voiceless *w* ...".¹⁷ But Sapir's "preceding aspiration" is probably assumed on the basis of the falling together of such reflexes with sequences of *s* plus resonants in Greek, so that if he concludes that the second series of resonants was voiceless, he can still assume that the laryngeals in question were aspirated, or tense, rather than voiceless, which he apparently does. Austin states that the second series of initial resonants were long voiceless phonemes: "Since the laryngeals were lost early in IE, and since a *w* in conjunction with a laryngeal in IH is represented as a phoneme distinct from the simple *w* in both Greek and Germanic, we must understand that IE had a long voiceless phoneme *hw* (in distinction to the voiced simple *w*) which was the result of the conjunction of any one of the first three (voiceless) laryngeals and a *w* in IH or early IE".¹⁸ The direct evidence for this assertion concerning the character of the second series of resonants in Pre-Greek must be the same as in the case of Sapir.¹⁹ Lehmann has also pointed to the falling together of the reflexes of original sequences of *s* and *h* plus resonants as evidence for the voiceless character of two of the IE laryngeals.²⁰ The proof is based on the orthographical and inscriptional interpretation of reflexes in Greek of *s* followed by resonants, and we have had occasion to conclude that Sturtevant's synthesis of this evidence does not invariably lead to voicelessness for the IE laryngeals involved, and not even for the second series of resonants as a whole.²¹ In fact, the development of a contrasting series of resonants can be explained by starting with the opposition tense/lax assigned to *H*₂ vs. *H*₃. For Pre-Greek then it is necessary to postulate the falling together of *H*₁ and *H*₂ as opposed to *H*₃

¹⁷ *Op. cit.*, p. 270.

¹⁸ *Op. cit.*, p. 89.

¹⁹ Austin includes the evidence from Homeric lengthenings as laryngeal reflexes, and this contributes to the reasons for considering the second series of resonants (whether after original *s* or laryngeal) as long (voiceless) as opposed to short (voiced) resonants, although both features are certainly not distinctive. Both Messing (*op. cit.*, pp. 195-196) and Cowgill (*op. cit.*, pp. 119-121) have pointed to the difficulties of independently establishing initial laryngeals for these forms which according to Austin make position in Homer. In any case, to call the second series of resonants long phonemes on the basis of metrical lengthenings in Homer is to confuse two different stages in the history of Greek. Considering such forms as Gk. *νέφος* but not **ανεφος*, Skt. *nábhaḥ*, which make position in Homer, to transcribe them *νέφος*, i.e. with long initial *ē*, may be useful to indicate the fact that *v* makes position at that period of Greek when all trace of the supposed laryngeal had disappeared. It not only begs the question for that period of Greek when the laryngeal was indeed present, but it is an even less likely phonetic interpretation of the facts than to posit a stage **hn-*, i.e. resonant preceded by a laryngeal spirant, since it is obviously the initial consonant cluster that was responsible for a long preceding syllable.

²⁰ *Op. cit.*, p. 107.

²¹ See E. Sturtevant, *The pronunciation of Greek and Latin*, second edition (Philadelphia, 1940), pp. 69-76.

(as unmarked), since the latter cannot be said to have had any demonstrable effect on initial resonants. Now sequences of H_1/H_2 plus resonants, since the flat/plain opposition was surely no longer relevant, would in Pre-Greek appear as true aspirated resonants, so that regardless of the particular nature of the reflexes of s plus resonants (voiceless or aspirated) the two would naturally fall together as opposed to initial voiced resonants. In this case, the tense/lax opposition for initial resonants might have been realized as aspirated and/or voiceless and one does not need to insist that the H_1/H_2 in Pre-Greek was necessarily voiceless.

If we consider now the type of merger of the IE laryngeals as far as the Pre-Greek and Indo-Iranian reflexes are concerned, only H_2 (i.e. h , marked with respect both to flatness and tenseness) either alone, or merged with IE H_1 , (i.e., h , — flat laryngeal spirant), leaves direct reflexes in the IE languages. Although the acceptable number of such reflexes is small, it nevertheless follows that only the doubly marked IE laryngeal (H_2) has left certain reflexes. IE H_1 , by hypothesis tense/lax only as a positional variant, has thus merged with either the tense laryngeal (H_2), as in Pre-Greek, or with the lax laryngeal (H_3), as in Indo-Iranian. The former situation seems also to be the case for Hittite, as we shall discuss below. This evidence presents interesting similarities with the history of these sounds in Semitic languages, which supports the claim that typologically the system of laryngeals in IE is analogous to that of Semitic in general. Thus Messing has remarked, concerning the modern Semitic languages, that modern Abyssinian as well as modern Syriac have merged ʕ with ʔ .²² The same is true for Tigrīña and Amharic (i.e., Ethiopic) as well. In both South Arabic Mehri and Mandaic h is kept distinct from the merger of ʕ and ʔ .²³ The difficulties of cuneiform interpretation make the question for East Semitic less clear, but at some period (probably Old Akkadian) before the merger of PS ʔ and h (i.e., ʔ 1-2) and of PS h , ʕ g (i.e., ʔ 3-5) in Assyro-Babylonian, which merger is identified indirectly only from the influence of these sounds on neighboring vowels and from cognate evidence, there is at least some evidence that h was kept distinct orthographically from ʔ 4-5.²⁴ The historical development of the laryngeal sounds in terms of merger is thus substantially the same in IE and Semitic.

6.14. Since Hittite is the only IE language in which at least some of the IE laryngeals are preserved as consonantal phonemes, it might be hoped that orthographic evidence of one kind or another would reveal some of the phonological characteristics of the IE laryngeals. The difficulties in the way of this assumption, however, are: (1) the problems of establishing the relation of the orthographic practice concerning the laryngeals to the sound pattern of Hittite as a whole, and (2) the fact that Hittite has undergone

²² *Op. cit.*, p. 226.

²³ Cf. Brockelmann, *op. cit.*, pp. 120-128.

²⁴ See Gelb, *op. cit.*, p. 119; W. von Soden, *Grundriss der akkadischen Grammatik* (Rome, 1952), p. 24. The evidence involves the interpretation of the sign $\text{Ē} = \text{ʔa}$ (No. 174 of the Akkadian sign list, given in Gelb, *op. cit.*, pp. 220-235), where the ʔa- is etymologically derived from $*\text{hē-}$.

a number of phonological innovations as far as the IE consonant inventory is concerned, and the possibility that such innovations include developments concerning the laryngeals cannot be ruled out *a priori*.²⁵ Although the evidence that Couvreur presented to establish the distinctive value of the double vs. single writing of the laryngeals in Hittite is not wholly without difficulties, we agree that at least intervocalically *-h(h)-* vs. *-h-* is probably to be interpreted as a contrast of tense vs. lax.²⁶ Sturtevant has argued that *-h(h)-* vs. *-h-* ought to be interpreted phonologically as a contrastive voiceless vs. voiced velar spirant, i.e. *x* vs. *ɣ*, although he does not interpret these reflexes diachronically in the same way as Couvreur. The basis of his argument, of course, is that Hittite cuneiform writing was borrowed directly from the Hurrians.²⁷ Now Speiser has shown that the phonetic value of the Hurrian *h-* signs, based directly on Ras Shamra Hurrian, i.e., Hurrian written in Ugaritic alphabetic characters, must have been nearer to *[h]*, i.e., *[x]* than to *[h]* or *[h]*, since Ugaritic possessed symbols for both sounds, and Ras Shamra Hurrian uses only the *h*-symbol. Speiser also believes that double vs. single writing of the *h*-signs intervocalically represents a distinction of *x* vs. *ɣ*, i.e., voiceless vs. voiced velar spirants.²⁸ The matter is at least in one respect clearer for Hurrian than for Hittite, since Ras Shamra Hurrian was based on a writing system which distinguished a velar from a laryngeal spirant, so that the choice of

²⁵ The evidence for interpreting the relevant features of Hittite as innovations rather than as archaisms in relation to the remaining IE languages as a whole is one of the central issues of the Indo-Hittite thesis, which is carefully summarized in Sturtevant, *The Indo-Hittite laryngeals* (Baltimore, 1942), pp. 23-34, and which includes also full bibliographical references to the history of the Indo-Hittite controversy. At least some of the controversy is terminological, since one has to recognize a PIE earlier than PIE in the Brugmann sense, or in other words a PIE characterized by the presence of stable laryngeal phonemes, as well as other features not part of IE in the Brugmann sense. Of course, it might be more profitable to redefine IE rather than to operate with two separate chronological stages of IE before any dialectal split of the IE languages. In any event, Hittite is certainly more archaic than the other IE languages as a whole in certain features, e.g. the preservation of part of the IE laryngeal system as consonantal phonemes, or in the morphology, an abundance of *r-/n*-stems, which occur in the other IE languages only as infrequent morphological remnants. See now E. Benveniste, *Hittite et indo-européen* (Paris, 1962), for a number of comparative studies of IE and Hittite with many examples of Hittite archaisms as well as innovations. But the widely differing appearance of Hittite from the other IE languages is now generally agreed to be the result of intense innovation, rather than extreme archaism, so that even as a label, Indo-Hittite is not warranted.

²⁶ See Couvreur, *op. cit.*, pp. 25-28, 189-194, and also §1.5-6.

²⁷ See Sturtevant, *A comparative grammar of the Hittite language* (New Haven, 1951), pp. 2-4; cf. also Speiser, *Introduction to Hurrian* (New Haven, 1941), pp. 11-15. That the cuneiform writing of Hittite and Hurrian belong to a characteristic group of cuneiform documents, based mainly on such features as the confusion of signs for voiced and voiceless consonants, the lack of signs for emphatics, or their use interchangeably with velar stops in general and so on, and ultimately derived from a form of writing that antedates Old Babylonian, i.e. probably Old Akkadian, is the generally accepted view of Hittitologists as well as cuneiform scholars. See e.g. on this subject F. Thureau-Dangin, *Le syllabaire akkadien* (Paris, 1926), pp. IVff.; W. von Soden, *op. cit.*, pp. 21-22. Th. V. Gamkrelidze has objected to the Hurrian source of Hittite cuneiform in his "The Akkado-Hittite syllabary and the problem of the origin of the Hittite script", *Archiv orientální* 29.406-418 (1961). He attempts to prove that the source of the Hittite cuneiform is that used at Yamḥad and Qatna in Northern Syria. Whatever the possibilities that Gamkrelidze may be right in this matter, the question of the laryngeal and velar spirants, discussed below, is not affected.

²⁸ *Op. cit.*, p. 45.

one rather than the other ought to mean that the borrowed sign was closer to one Hurrian sound than the other in phonetic composition. This cannot be the case for Hittite, since Hurrian presumably possessed only velar spirants, so that one can only conclude that the Hittite *h* sounds were close enough phonetically to the Hurrian *h* sounds to make the use of the latter symbol in Hittite reasonable, and this certainly does not rule out all possibilities for the Hittite *h* sounds except velar spirants. Since we assume that the IE laryngeals were true laryngeal sounds, the Hurrian *h*-signs could be used without much difficulty for laryngeal as well as velar spirants. There is little need, e.g., to recall the instances of Semitic merger of *g*, *h* with *ʕ*, *h* in numerous Semitic languages to support typologically the closeness in both articulation and perception between the velar and pharyngealized laryngeal spirants.²⁹ It is true that Gamkrelidze has argued for the non-Hurrian origin of Hittite cuneiform writing, but it is significant that only Old Akkadian presents evidence for separate cuneiform indication of a laryngeal and velar spirant, so that the cuneiform writing of Northern Syria, which Gamkrelidze takes as the source of Hittite writing, would no more have had separate signs for laryngeal spirants than the cuneiform writing of Hurrian.

There exists, however, indirect evidence for assuming laryngeal rather than velar phonemes for Hitt. *-h(h)-* vs. *-h-*. Messing has pointed out that "The fact that Accadian texts from Boghazköi show repeated confusion of *ʔ* and *h* cannot be explained if Hitt. *h* represented the strong Accadian pharyngeal, but it is explicable if the Hittite scribe took the *h* as his own laryngeal spirant".³⁰ Of equal importance is the development of the IE stop system in Hittite and the orthographic representation of original sequences of any IE stop plus laryngeal. The double vs. single writing of stops in Hittite is precisely the same as in Hurrian, in which cases the interchange of the Akkadian signs for voiced and voiceless consonant (plus vowels) is non-significant, whereas double vs. single writing of either series appears to indicate a phonemic contrast. Speiser has argued that the phonological difference between double and single stops is not voiceless vs. voiced, but that the latter are in fact voiceless mediae, in other words a distinction of tense vs. lax, so that voice and voicelessness were probably only positional variants of both series.³¹ Although Sturtevant has pointed to the etymologically consistent relation between IE voiceless stops and double writing, and correspondingly IE voiced stops and single writing in Hittite, it is now fairly accepted doctrine that the relevant distinction in Hittite is not voiceless vs. voiced, but rather tense vs. lax, so that length is the regular concomitant feature of the tense opposition.³² Gamkrelidze

²⁹ See Brockelmann, *op. cit.*, pp. 120-128 for the evidence summarized.

³⁰ *Op. cit.*, p. 223.

³¹ *Op. cit.*, pp. 35-36, 61.

³² See Sturtevant, *op. cit.* (1951), pp. 26-28, which includes previous bibliography; also R. A. Crossland, "A reconsideration of the Hittite evidence for the existence of 'laryngeals' in Primitive Indo-European", *Transactions of the Philological Society* (1951), 88-130, pp. 125-128. For the view that the two series of stops in Hittite are opposed in terms of fortis vs. lenis, or tense vs. lax, rather than voiceless vs. voiced, see Couvreur, *op. cit.*, pp. 25-28, which includes a discussion of the supporting bibliography.

has thus described the Hittite stop ‘*Lautverschiebung*’ as the shift of IE voicelessness > aspiration (or tense), and voiced > unaspirated (or lax), so that neither series is distinctive with respect to voiceless vs. voiced. Additional support for characterizing Hittite *-h(h)-* vs. *-h-* as a contrast of (laryngeal) tenseness vs. laxness is the possibility that sequences of all three series of IE stops and following laryngeal are represented orthographically in Hittite by double writing, i.e., as the unaspirated, or tense stops — e.g., *me-ik-ki-iš*, ‘large’, Gk. μέγας, < **gH-*; *šu-up-pi-iš* ‘sacred’, Skt. *bhāti* ‘shine’, the Hittite form < **su-bhH-is*; *du-uk-ka-ri* ‘wird zuteil’, < **dhughH₂-ori*, Gk. τύχη etc.³³ Now the falling together of all three series of IE stops and following laryngeals with the aspirated series in Hittite could be understood simply by assuming that the Hittite laryngeals are derived from laryngeal spirants. The Hittite unaspirated (lax) stops (< IE voiced stops and voiced aspirates) when followed by a laryngeal spirant (or laryngeal aspiration) would be equivalent to the Hittite aspirated or tense series of stops. The orthographic doubling of older IE voiceless stops plus laryngeals could be understood simply as the structural impossibility of a phonemic distinction between aspirated or tense stops and aspirated or tense stops followed by laryngeal spirants. It is probable that the general loss of laryngeals before and after stop consonants originated from these developments. As far as the historical development of the laryngeals in Hittite is concerned, *H₂* is distinguished only intervocalically in Hittite orthography from *H₁* and *H₃*, the latter having in that position merged in Hittite, and is indicated by single writing. The cuneiform does not indicate a contrast between the tense and lax laryngeal in initial position, but this fact of course is to be understood within the general impossibility of indicating initial tense stops in the Hittite cuneiform syllabary. Apparently *H₁* is not found initially in Hittite, so that its occurrence intervocalically (or merger with *H₃*) but not initially may give some clue to the positional variants of *H₁* in IE, i.e., presumably tense (or *-h-*) intervocalically, but lax (or *ʔ*) initially. Thus Hittite is another instance of the merger of *H₁* and *H₃* as opposed to the doubly marked IE *H₂*.

6.2. I have tried to show by the previous examples that interpreting the reflexes of the IE laryngeals in terms of the phonological system which I have set up for them does

³³ See H. Hendriksen, *Untersuchungen über die Bedeutung des Hethitischen für die Laryngaltheorie*, Det Kongelige Danske Videnskabernes Selskab Hist.-fil. Medd. 28 (1941), pp. 52-54; H. Pedersen, *Hittitisch und die anderen indoeuropäischen Sprachen*, Det Kongelige Danske Videnskabernes Selskab Hist.-fil. Medd. 25 (1938), pp. 36-37; Gamkrelidze, “Peredviženie soglasnyx v xettskom (nesitskom) jazyke”, *Peredneaziatskij sbornik: voprosy xettologii i xurritologii* 211-291, edited by I. M. Diakonov and G. V. Tsereteli (Moscow, 1960), English summary, “The consonantal shift (*Lautverschiebung*) in Hittite (Nesite)”, 588-592. Professor Watkins has pointed out to me that none of the etymologies given for this assumption is secure. Thus Benveniste (*op. cit.*, pp. 111-112) rejects the connection of Hitt. *mekki-* with Gk. μέγας, etc., on the basis that the form in Hittite is ‘numerous’, never ‘large’, and therefore is to be compared with Toch. A *māk* ‘numerous, many’. Similarly Hendriksen’s gloss ‘wird zuteil’, really ‘falls to ones lot’, while it is certainly correct for the Greek forms, is not listed at all by Friedrich (*Hethitisches Wörterbuch* [Heidelberg, 1952-1957], pp. 217-218) for Hitt. *dukkari*. The sense of Hitt. *šuppi-* ‘sacred’ is not at all necessarily connected with (u)*bhā-* ‘shine’ in Sanskrit.

not violate any continuity in the structural bases of the IE phonological system.³⁴ In other words, the reflexes of the laryngeals discussed here appear to be a natural (but not necessary) consequence of the kinds of distinctive features I have postulated for the laryngeals.

³⁴ See C. Watkins, *op. cit.*, pp. 237-238.

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